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THE

Extenſive Practice

OF THE

NEW HUSBANDRY,

EXEMPLIFIED

ON DIFFERENT SORTS OF LAND, FOR A COURSE OF YEARS;

IN WHICH

THE VARIOUS METHODS

OF

PLOUGHING, HOEING, HARROWING, AND MANUREING;

AND EVERY OTHER PROCESS IN

AGRICULTURE,

RECOMMENDED BY

MR. TULL, SIR DIGBY LEGARD, MR. DUFF, MR. RANDALL, OF YORK; ARTHUR YOUNG, ESQ; AND THE COMPLETE FARMER, ETC. ARE CONSIDERED AND EXAMINED.

TO WHICH IS ADDED

AN APPENDIX,

CONTAINING

PARTICULAR DIRECTIONS FOR PRACTISING HUSBANDRY IN THE BEST MANNER, AND WHERE THE DRILL-PLOUGH MAY BE HAD THAT IS USED IN IT.

THE SECOND EDITION.

BY MR. FORBES.

LONDON:

PRINTED FOR W. TAYLER, N° 5, WARWICK-COURT, WARWICK-LANE, 1786.

[PRICE FIVE SHILLINGS IN BOARDS.]

S495
F74e
1786

ENGLISH HUSBANDRY.

ALL who practiſe the *New Huſbandry*, exemplified in the following Treatiſe, or who incline to make a candid Trial of it, may now be ſupplied with A DRILL PLOW accurately conſtructed on the Principles improved by the lateſt Experience of the celebrated Mr. TULL.

By this Plow, all Seeds, from *Beans* to *Turneps* and *Lucerne*, may now be properly delivered in Rows of any Diſtance, with regularity and diſpatch.

And the Inſtrument can at laſt be obtained at an unparalleled and unexpected *low Price*, occaſioned by the ingenious Conſtruction of it

By Mr. JOSEPH TYLER, Cabinet-maker, at N° 54, in Wardour-ſtreet, Soho.

THE

EDITOR

TO THE

READER.

THE publication of this little treatiſe has been delayed till now, by the death of its author Mr. Forbes.

The work was printed off under his inſpection; and the following pages, that precede it, were prepared for the preſs by him.

The reader will perceive that the intention of this publication was to extend the practice of the celebrated Mr Tull's Horſe-hoeing Huſbandry, according to the genuine method of that gentleman, upon his lateſt improvement of it.

To obtain this end, Mr. Forbes had alſo prepared for the preſs an accurate edition of Mr. Tull's Eſſay, containing the final rules he drew from the whole courſe of his experience, and his many valuable remarks, that lie almoſt ſmothered in the polemical appendixes, &c. to which Mr. Tull was provoked by thoſe literary vermin, that are as injurious to the agriculture of England, as the fly is to our turnips. And this work will not be loſt to the public, ſhould a charitable diſpoſition, to a poor widow and diſtreſſed family, ſufficiently prevail among the friends to rational agriculture.

What

What is ſaid in the following advertiſement of the inſtruments neceſſary to this method of Huſbandry, was in great forwardneſs when Mr. Forbes died; and may be yet carried into execution, if, from application to the publiſher, there ſhould appear to be any demand for them. And in ſuch caſe, every poſſible method ſhall be taken to inſure juſtice to be done to the purchaſers.

The laſt part of the advertiſement will not indeed be ſo eaſily ſupplied. Mr. Forbes was a gentleman of much experience and ſkill in this Huſbandry; he was an unconceited man of integrity; and was actuated by no bye-views that could interfere with his earneſt deſire to promote this Engliſh method of agriculture, which, after long practice, checked by ſound theory, he found to be the beſt.

Whether any perſon, equally to be relied upon, can be found to do the good ſervice to our Huſbandry that Mr. Forbes propoſed, muſt be left to time to diſcover. But the public may be aſſured, that no other will be preſented to them in any connection with the Editor of the preſent work.

TO THE

RIGHT HONOURABLE

THE

EARL OF MARCHMONT,

THIS

TREATISE

ON THE NEW

HUSBANDRY

IS, WITH GREAT RESPECT, INSCRIBED

BY HIS LORDSHIP'S

MOST OBEDIENT SERVANT,

THE AUTHOR.

INTRODUCTION.

SOME late Writers on Agriculture having raiſed objections to the New Huſbandry; it was thought neceſſary, and the moſt agreeable method, to ſatisfy the publick of the great utility of this Huſbandry, to produce from authors of credit their extenſive experience and ſucceſsful practice of this culture for a long ſeries of years; which it is preſumed will fully prove, that its principles are founded in nature, and that the general practice thereof will be a national benefit.

ABSTRACT

ABSTRACT

OF

THE CONTENTS.

THE different methods of cultivating land in the Old and New Huſbandry for corn.—The food of plants; different opinions concerning it. Plants receive it principally by their roots, and from the earth; but common earth is not that food; it is communicated to the earth from the atmoſphere, in proportion to the quality of the ſoil.—The firſt hints of the New Huſbandry taken from the Vineyards in Languedoc, by Mr. Tull, the firſt inventor of the drill-plough, and new ſyſtem of vegetation.—His ſucceſs in the culture of wheat upon ordinary land, without manure, for thirteen years, by means of deep

deep hoeing. The cauſes of this effect.—Not neceſſary for farmers to know the nature of the vegetable food; but very uſeful for them to know, that it is derived from the atmoſphere.—The different methods of hoeing, and the inſtruments adapted to each deſcribed.—Hoeing with a plough ſuperior to all others, and the reaſons.—Objections to this huſbandry conſidered and anſwered; particularly thoſe made by Mr. Harriſon, and the author of the Farmer's Kalendar.—The uſe of manure in the Old Huſbandry admitted, and to many hoed crops; but not neceſſary for wheat and other corn, proved from Mr. Tull's ſucceſs, and from the ſucceſs of ſeveral eminent cultivators in Britain, who have practiſed this huſbandry extenſively, and upon various ſorts of land, from eight or nine to near thirty years.—The profit of this beyond the Common Huſbandry ſhewn.—Dung and manures of great uſe, when applied properly; otherwiſe very prejudicial to the farmer. A ſtriking inſtance of this given.—Land well horſe-

hoed

hoed requires no reſt. Greater crops of turnips obtained thereby, than by hand-hoeing, ſhewn by an accurate compariſon.—The Alternate Huſbandry deſcribed, and ſhewn to be much inferior to the New Huſbandry, with reſpect to profit.—The Hoeing Huſbandry of univerſal uſe, applicable to plants in general, and in all climates, exemplified in the culture of the ſugar-cane; may be practiſed to great advantage, where little or no manure can be had, either on light land, or very ſtrong land, of difficult culture in the Old Huſbandry.—The ſuperior advantages of the New Huſbandry, in ſeveral reſpects, to the farmer, and to the publick.—Other examples given of the comparative advantages of the Old and New Huſbandry; and the New proved to be the moſt profitable, from a ſeries of crops of eight years continuance; and the New ſhewn to be the leaſt expenſive.—The New proved to be the moſt advantageous, from a compariſon with the moſt improved culture in the Old Huſbandry in Suffolk,

folk, near Scarborough, and in Switzerland. Some miſtakes in the practiſe of the New, in England, pointed out; and remarkably in Ireland.—A very late and valuable author, a favourer of the New Huſbandry. Some obſervations upon his method, and the inſtruments he recommends, with improvements.—Many remarkable experiments made in France and Italy, which confirm the principles of the New Huſbandry; but, throughout this eſſay, are fully proved by practical examples in Britain, from perſons of undoubted credit and character, of very extenſive practiſe on various ſorts of land, and for a courſe of years.—And the objections of ſome modern authors, anſwered; and ſhewn to be erroneous and inconcluſive.

ADVER-

ADVERTISEMENT.

WHEREAS many perſons, deſiring to practiſe the *New Huſbandry*, have been diſcouraged from attempting it, for want of the proper inſtruments; the author of this treatiſe hath undertaken to furniſh the inſtruments for that Huſbandry, upon an improved conſtruction, and at the loweſt prices; and, to prevent impoſition, all that are genuine will be ſtamped with his name; and a note, ſigned by him, will be ſent with ſuch inſtruments only as ſhall have been examined and approved of by him. As ſoon as the firſt of theſe inſtruments is ready (which will be in a few weeks), public notice thereof will be given in the *Daily Advertiſer*, and in the *St. James's Chronicle*.

If the purchaſers of theſe inſtruments ſhall find any difficulty in uſing them, or of practiſing the New Huſbandry in any other reſpect, and pleaſe to communicate the ſame by letter, with their addreſs

addreſs, to the publiſher hereof, the author will anſwer their letters, endeavour to explain the difficulties that may ariſe, and, for the benefit of the public, will publiſh the ſame *occaſionally*, together with ſuch valuable and authentic experiments in Agriculture, as his correſpondents ſhall favour him with, as ſoon as they amount to a ſmall volume.

Sept. 11, 1777. FRANCIS FORBES.

THE

OF THE NEW HUSBANDRY, AND The IMPORTANCE of it to BRITAIN.

THE New Huſbandry is an improvement of the Old: but the tillage is performed in a different manner, and at different times.

In the Old Huſbandry, the tillage, *viz.* the ploughing and harrowing, is done firſt: the ploughing, to open the land; and the harrowing, to make it fine, and get out the weeds. Dung, or other manure, is then ſpread upon the land, which is ploughed-in; and then the ſeed, as of wheat, or other corn, is ſown by hand, broad-caſt, which is covered by the plough or harrow. Nothing more is uſually done till harveſt, except weeding, when the weeds are grown up pretty large. Dung promotes the growth of weeds; and though many

of the large weeds are pulled up, the others remain, run to ſeed, and fill the land with weeds; and theſe, together with thoſe that were pulled up, and a large quantity of ſeed-corn, very much impoveriſh the land. To ſupport theſe, and keep the ſoil open for the roots to ſpread in it, dung is added to the tillage: but, as the land receives no more tillage while the crop is growing, from ſeed-time to harveſt, which for wheat is from September to Auguſt, or about ten months, and more in very light land, the land during that time becomes ſtale and hard, particularly ſtrong land; for the tillage, to open the land, makes it lighter and more porous than it was naturally; but no ſooner is the tillage finiſhed, than the earth begins to ſettle and ſubſide, and continues to do ſo till it recovers its natural ſpecific gravity, and it then becomes as cloſe and conſolidated as it was before any tillage was beſtowed upon it. This gradually confines the tender roots of the plants, ſo that they cannot ſpread and extend ſo much as in open and porous ground; and by this means many of the plants have not ſufficient nouriſhment; many of them are thereby ſtinted, and not a few are ſtarved, and die; as is plainly ſeen in all crops of wheat ſown broad-caſt, with a large proportion of ſeed.

Theſe inconveniencies are prevented by the New Huſbandry. The land is made very clean from weeds at firſt, by planting ſingle rows

rows of large plants, upon ridges, between four and five feet broad, as of turnips, beans, &c. Theſe are horſe-hoed alternately, by ploughing away the earth from the rows of plants, firſt from one ſide; and after returning the earth to the row, plough the earth away from the other ſide, and thus alternately; allowing a proper ſpace of time between each hoeing, *viz.* till the weeds begin to grow, and ſo as never to ſuffer the earth of the intervals to grow hard or ſtale, and always to hoe when the earth is dry, and will break and crumble into ſmall parts, called pulverizing. Theſe hoeings, being repeated, will deſtroy the weeds in the intervals; and the weeds next to and in the rows are likewiſe eradicated, by pulling them down with a hand hoe, and weeding the rows by hand. In this manner the land may be made clean; and till it is ſo, theſe crops of turnips or beans ſhould be repeated, which will be no loſs to the owner: for they will not only pay all expences, but will alſo produce a clear profit; and are therefore preferable to fallowing, unleſs the land is uncommonly foul.

The land, being thus made clean, will alſo be in fine tilth; ſo that once ploughing it will be ſufficient to form new ridges, of about four feet nine inches wide, upon the former intervals, and then the middle of the ridges will conſiſt of fine tilled mould, upon which two rows of wheat are to be drilled, nearly

two inches deep, with about three pecks of ſeed to the acre. This is the largeſt quantity uſually drilled; and the ſmalleſt quantity about two pecks to an acre, when ſown early and in very good land. In this method land is drilled with wheat to be horſe-hoed, the partitions to be hand-hoed, and the rows to be hand-weeded; that the land may be kept clean, and no weeds ſuffered to run to ſeed, or to grow large, which ſhould be carefully prevented. The land thus cultivated will be kept clean; nor can it grow hard and ſtale, as in the Old Huſbandry; for it is to be repeatedly hoed in the intervals with the hoe-plough, and the partition between the double rows, which are ten inches aſunder, are hoed and kept clean with the hand-hoe; by theſe operations, the land is kept looſe and open, and in an high ſtate of pulverization, all the time the crop is growing; which ſo encourages the plants to ſpread their roots, to form new ones, and furniſhes them with ſuch abundant nouriſhment, that they tiller or branch greatly; produce larger ears and fuller grain than one commonly produced from wheat ſown broad caſt with three times the quantity of ſeed; and, what is of great value, the hoed wheat crops, if the hoeing is well performed, require no dung or other manure; which is not only a ſaving of the principal expence of broad-caſt wheat, but alſo enables the owner to conquer the weeds, as none are

brought

brought to hoed wheat among dung or other manure.

It is found by experience that the deep or horſe-hoeing enriches the land, not only to produce a ſingle crop of wheat (which is all that is commonly obtained of ſown wheat); but to ſo great a degree, that a ſecond third, and a ſucceſſion of wheat crops, are obtained by this culture, for as many years ſucceſſively upon the ſame land, as the owner thinks proper to cultivate it in this manner by the hoe-plough, and that without manure. This is an uncommon circumſtance; for conſtant ſucceſſive crops of wheat cannot be obtained in the common huſbandry, even with the aſſiſtance of manure; nor is it uſual for farmers to ſow land with wheat even two years ſucceſſively, though manured.

Land is impoveriſhed, in ſome degree, by every crop taken from it, whether of wheat or other corn; which all farmers allow, and are ſenſible of, and they endeavour to reſtore the land, and recover its loſt fertility, by tillage, fallowing, and manure. They do not apprehend that tillage and fallowing alone will recover it, and here no manure is uſed; whence then is the land recruited with vegetable nouriſhment, as in this caſe, that it is able to bear crops of wheat, year after year? And this not only without being impoveriſhed; but, on the contrary, land of moderate fertility is found to become more fer-

tile by this tillage, well performed, though it bears a crop every year. This is totally different from the effects of the common Husbandry; though the land in that Husbandry has the assistance of manure, and the hoed wheat crops have no such assistance. This recruiting of the soil is not the consequence of tillage and hoeing; these do indeed break, divide, and pulverize the soil; but breaking, dividing, and pulverizing, are mere mechanical operations; they add no new matter to the land, and are therefore so far of themselves from enriching land, that they only prepare it for the roots of plants to run and extend in it the more freely, which, instead of enriching the land, only prepares it to be more readily exhausted of its fertility, for the more pabulum, or the more nutritious aliment, the roots draw from the land, the poorer the land becomes, and the less stock of nourishment is left in it, to support the next crop. Tillage therefore, ploughing, harrowing, and hoeing, add nothing to the fertility of land; they only prepare and open the land, for the roots to run, extend, and multiply in it; this helps to nourish the plants, yet does not add to the fertility of the land, but only prepares it to be the more quickly exhausted of the vegetable nourishment.

I have insisted upon this the more particularly, because farmers do not usually attribute

their land recovering its fertility to any thing but dung and manure; and thoſe late authors, who mean to decry the New Huſbandry, do not appear to comprehend the true practice of it, nor the principles upon which it is founded; as we ſhall have occaſion to ſhew, and to prove that its principles are founded in nature.

The operations of nature are not the objects of our ſenſes; they are too abſtruſe and ſubtle to be diſcovered by us: for which reaſon, we know not certainly what is the vegetable food, or that matter which intimately joins, and unites with, the ſubſtance of plants, and whereby they are enlarged and nouriſhed. Several learned and ingenious men have endeavoured to diſcover this, but hitherto without ſucceſs; and they differ much in opinion. So that, if this were neceſſary to be known, it does not appear that farmers, or any cultivators of land, could attain to any certain principles of vegetation: and, what is ſtill of further importance, we are not certain whether the knowledge of the food of plants would enable us to derive any practical advantages from it.

It appears from experiments, that the leaves of plants imbibe air and moiſture; and with theſe, other kinds of matter; but the principal ſource of the vegetable food is univerſally allowed to be derived from the earth, whence plants receive their nouriſhment

chiefly by means of their roots, and principally by their fibrous or ſmall roots; for they are ſeen, by good microſcopes, to be ſpongy or porous on their ſurface. The vegetable food enters at theſe pores, and, by a wonderful mechaniſm, is thence conveyed to the ſeveral parts of the plant.

If the earth were denſe and ſolid, the roots of plants could not penetrate into it, to collect nouriſhment: but all earth conſiſts of parts of various ſizes, from ſtones and gravel, to fine ſand and an impalpable powder. This is ſeen by diſſolving earth in water, in a tall glaſs; wherein the earth, when broken, mixed and diſſolved in water, will ſettle, the largeſt and weightieſt parts deſcending firſt, and the reſt in order, according to their ſeveral reſpective gravities; the fineſt and lighteſt parts ſubſiding laſt of all, and ſettling at top. This ſubſtance that ſettles at top is very viſible in groſs; but the parts of it next the top are ſo exceedingly minute, that their figure and conſiſtence cannot be diſtinguiſhed by the naked eye, and the fineſt of them not even by the aſſiſtance of the greateſt magnifiers. It is eaſy to obtain this fineſt part, by taking it off the top of the glaſs; or it may be obtained ſeparate, by waſhing over, in the manner performed by colourmen.

All ſorts of land have in them ſome of this fine matter in different proportions. Gravelly ſoils have but little of it; ſandy ſoils have more

more (except ſheer, ſharp ſands, which contain none of it, or very little): but rich loams, and rich clays, contain the largeſt proportion. This matter, ſo far as it can be traced by the eye or microſcopes, appears to be ſand, and probably it is all ſand; for ſuch of it as is too fine to be denominated ſo with certainty, has the ſame colour and appearance as that part of it that is ſeen to be ſand. There are other means of diſcovering the nature and qualities of the fineſt part of this matter: and it is recommended to the curious to examine it further.

The ſurface of ſmall bodies is larger than the ſurface of bodies that are greater, in proportion to their reſpective ſolidities; and when the ſurfaces of the ſmaller bodies are joined, they touch in more points than the larger, and therefore cohere more ſtrongly. Hence clayey ſoils have a ſtronger coheſion than loams whoſe parts are larger; and, for the ſame reaſon, loams cohere more ſtrongly than ſands or gravels. Pure clays, having neither ſtones nor coarſe ſand in them, cohere very ſtrongly, are of difficult tillage, and require great ſtrength of cattle; whereas ſands having larger parts, and touching in few points, are looſe and eaſily tilled; ſome of them tilled as eaſily by one horſe as ſtrong clays are by three or four. A loam that conſiſts of a juſt proportion of large and ſmall parts,

parts, is flexible, ſuitable to all ſorts of plants, and profitable to cultivate.

The roots of plants are of different degrees of ſtrength. Beans and oats penetrate into cloſe ſtrong land, better than barley; and tap-rooted plants puſh their tap-roots deep in the ground; but their lateral or ſide roots, as of carrots, are ſlender and weak; yet are the carrots or tap-roots nouriſhed by the weak lateral roots; for when the weak lateral roots are able to penetrate and extend, as in light ſandy ſoils, the tap-roots alſo grow ſtrong and penetrate deep into the ground; but in ſtrong ſoils, where the lateral roots are confined by the hard, cloſe earth, and they cannot collect much nouriſhment, the tap-roots alſo ſuffer, and are unable to penetrate deep into the ground. If carrots are in ſtrong land, their lateral roots cannot extend and collect nouriſhment for the plant, which then declines; but if the ſtrong land is lightened, and kept open by good hoeing, not only the weak, lateral roots are at liberty to range for food, but the carrots, or tap-roots, are thereby ſo much ſtrengthened, that they penetrate into the earth below, even though it remains hard, and deeper than it is opened by the plough.

It appears, in this and in many other caſes, that plants receive their nouriſhment principally by means of their fibrous or ſmall roots; but whence are the roots ſupplied with this nouriſh-

nouriſhment? Many farmers and others think, that the earth is recruited of the vegetable nouriſhment by manures: but what recruits the land that is not manured, and yet continues to bear annual crops of wheat; and not only wheat, but all other horſe-hoed crops; as of barley, or other corn; and that may be had every year ſucceſſively, without manure? Annual crops of peaſe, beans, tares, and other plants may be continued without manure; and ſo large plants, as vines are thus cultivated, and annually produce large quantities of grapes, without any manure at all: the low vineyards in France and Italy, which produce the beſt wines, are not manured, nor have any other aſſiſtance but the hoeings given by the plough. This is therefore the great point to be conſidered, the diſcovery of which will explain the true ſyſtem of vegetation, and the principal foundation of the New Huſbandry.

Some have ſuppoſed, that roots feed upon the fine particles of earth: but this cannot be admitted; for by much the greater part of land conſiſts of ſtones, gravel, and ſand; which are all too groſs and ſolid to nouriſh plants, or to enter the extremely minute pores of roots: or, if plants could be nouriſhed by fine earth, the proportion of it is ſo ſmall, in moſt ſorts of land, that if a quantity of it, ſufficient to nouriſh the plants, was carried off by every crop of corn and weeds, they would carry off ſuch large quantities, and carrots, parſnips, cabbages, potatoes, and other large plants,

plants, ſo many tons every year, that the richeſt land would be ſoon exhauſted of all its fine parts, and, if carried away by the crops, could never be recruited again, but the land would be exhauſted of all its fertile parts, and would remain for ever after emaciated and totally barren; which is contrary to experience; for the lands that were noted for their fertility and depth one or two centuries ago are known to continue the ſame to this day; they have ſtill the ſame depth of ſtaple, and the ſame remarkable fertility, that they had in former times; whereas, had every crop for a ſeries of ages, or only for one or two centuries, carried off part of their fertile earth, they muſt long ago have been totally exhauſted of their fertility. We muſt therefore endeavour to diſcover elſewhere the genuine ſource of the vegetable nouriſhment, by which ſuch weighty crops are obtained every year, without diminiſhing the ſoil.

The earth is ſurrounded by a fluid body, commonly called the air, but more properly the atmoſphere, which conſiſts of all kinds of matter, of air, water, ſalts, oil, fire, and earths of every kind; for all the volatile parts that ariſe from the ſea, from lakes, rivers, and other waters, or moiſt places; all the exhalations from the earth, from hills, vallies, caverns, mines, or other dry places that are lighter than air, aſcend into it, float, and mix there: the perſpiration likewiſe from

trees

trees and all plants, from living animal bodies, and thoſe in a ſtate of putrefaction or diſſolution by fire or other agents; all theſe, and every kind of volatile matter lighter than air, aſcend into it, and compoſe that fluid body called the atmoſphere. In this body are contained the moſt active parts of matter, and the principles, or elements, of all natural bodies. This fluid body ſurrounds the earth's ſurface, and, being conſtantly in contact with the earth, muſt have very great influence upon it; and in fact we ſee it has ſo; for heat and cold, drought and moiſture, dews or rain, ſnow and froſt, do all proceed from the ſun and atmoſphere; they direct the ſeaſons and temperature of the air and earth, and are the great cauſes of its fertility, or of its barrenneſs.

Rain and dews contain the vegetable nouriſhment in conſiderable quantities; and it is by them introduced and depoſited in the ſoil. If the ſoil be looſe and porous, they introduce it to a conſiderable depth, as in light ſandy land; but ſtiff loams and clays being much more cloſe and compact, the rain and dews do not eaſily penetrate into them, or but to a ſmall depth; for which reaſon, ſuch cloſe lands are enriched by them near the ſurface only.

This is ſeen in land that has lain ſome time at reſt, whereof the ſurface, called the ſtaple, is of a ſomewhat darker colour, and richer

than the earth that lies deeper; for which reaſon, gardeners, when making compoſts, chuſe for that purpoſe, the ſurface of commons or paſtures, which they find to be the richeſt part of theſe ſoils. The dark colour of the ſtaple is from the influence of the atmoſphere, to which the ſurface of the land is moſt expoſed, and is always richer than the earth below; even though the lower earth be naturally of the ſame, or of a better quality than the ſtaple. But if this under-earth is brought up to the ſurface, and expoſed to the atmoſphere, it will in time be impregnated by the atmoſphere, and become as rich as the ſtaple. It will, however, require time to become as rich as the ſtaple, more or leſs, as it is more or leſs ſtrong or light, and pervious to the atmoſphere; for, as before obſerved, ſtrong, cloſe earth is not ſo eaſily penetrated, by the rains, dews, and other influences of the atmoſphere; nor do they go ſo deep in them, nor in ſo ſhort a time, as they do in lighter ſoils, that are more open, and more eaſily penetrated by the dews, rain, heat and cold, drought and moiſture, of the atmoſphere.

Hence it appears, that the richneſs of land does not conſiſt in the nature and qualities of the ſoil itſelf, but in ſomething extraneous that adheres to it, that is communicated to it by the atmoſphere, and that it may be diveſted of by the roots of plants; for it ſeems

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to adhere closely to the particles of the soil, and is not easily separated from them by any other means than by the roots of plants: all land enriched by the atmosphere continues so, in different states; if laid down to pasture in a rich state, it will be found rich, when broken up for arable, years afterwards: but, after it is broken up, it is soon impoverished by a few crops taken from it; unless care is taken, that it be at the same time recruited with new vegetable food.

That the vegetable food is something distinct from the earth, not natural to it, but adventitious, is derived elsewhere, and capable of adhering to it, or of being detached from it, in a greater or less degreee, has been observed by some husbandmen, whereof we have a remarkable instance in Mr. Lisle's Husbandry; who, speaking of the fertility of land being abated by cropping it, says, that this is perceivable by the colour and appearance of the land. "For," says he, "this vegetable "balsam, though so difficult to say wherein "it consists, yet, it may be averred, is as easily "seen as understood: for, though almost as "subtle as a phantom, yet its marks are "clearly discovered by the diligent husband-"man, conversant about arable land. We "can easily perceive, by the different colour "of our land (as it turns up under the "plough), whether it has borne one, two, "three, or four crops; and how, in propor-

"tion,

" tion, the virtue is gone out of it. And as " ſenſible are we, by its reſt, and lying to " paſture, how, with its vigour, it renews alſo " its colour. We do not better ſee and know " when the plumb or grape is covered with, " or has loſt, its bloomy hue, than we know " by the colour the fertility of our ſoil: " which colour ariſes from the principles be- " fore intimated, of dung, air, fire, earth, " &c. mingled together; which, by often " ſowing, are abſorbed into the corn in too " liberal a manner, to be renewed by a daily " recruit from thoſe elements."

This obſervation of Mr. Liſle's is agreeable to what is ſaid above; that the fertility of land is not any thing permanent in it, but is fluctuating, ſubject to be carried away by the crops, and reſtored to it again by the atmoſphere. Mr. Liſle attributes that partly to dung; but we ſhall ſhew hereafter, that theſe changes happen in land from the atmoſphere only, and where no dung or other manure is uſed.

It is further obſervable, that land is enriched by the atmoſphere in proportion to the nature and quality of the finer parts of it: for all land is not equally enriched, though equally expoſed to the atmoſphere. The ſheer, ſharp ſands, in many places, appear to be incapable of attracting or receiving the vegetable food; for they continue barren for ages, though conſtantly expoſed to the atmoſphere,

ſphere, as do alſo the ſhifting ſands in Norfolk and other places: for no ſeed or plant will vegetate in theſe ſands, nor in chalk, and ſome other calcareous earths, not even in thoſe hills of chalk that have for ages lain expoſed to the atmoſphere, and though the chalk conſiſts of exceeding fine parts.

The common method of preparing land for wheat is by fallowing and dreſſing it with dung or other manure, and, as before obſerved, after the ſeed is ſown and harrowed in, nothing more is uſually done to it till harveſt, unleſs the land be foul; and then the wheat is weeded in the ſummer. The quantity of ſeed ſown is from two and a half to about three buſhels; the crop is uncertain; ſome years from thirty to forty buſhels per acre, upon good land; and in others, not above half that quantity.

Another method of cultivating wheat was introduced by Mr. Tull; who, going abroad on account of his health, was ſome years in Italy and the ſouth of France. He was a curious obſerver of their agriculture, particularly of the low vineyards in Languedoc. They plant their vines there in ſtraight lines, about four feet diſtant, and frequently plough between them; which deſtroys the weeds, and keeps the land in tilth. With this culture the vines produced good crops annually, unleſs the tillage happened to be omitted; for then the vines languiſhed, and produced but little

wood, diſcoloured leaves, and ſmall bunches of poor ſtinted grapes: but ſoon after the tillage was renewed, the vines recovered, and yielded large cluſters of grapes, and good crops, as they had done before. Theſe vines are low, their heads juſt above ground, and their heads and roots being ſo near together, they found that dunging the vineyards in that hot climate, in order to obtain larger crops, gave the wine a bad taſte; and therefore the only culture they beſtowed was tilling the land between them with the plough, a practice that had been continued there for ages; and which the natives ſaw without making any reflections upon it: but Mr. Tull ſaw it in a different light, and as a law of nature, leading to a general ſyſtem of vegetation, that was applicable in other countries, and upon other plants. He was a lover of agriculture, had before practiſed it upon a farm he had in Oxfordſhire; particularly upon ſainfoin, which he had much improved: for the cuſtom before that was to ſow ſeven or eight buſhels of ſeed upon an acre of land; but he there invented a drill-plough, which ſowed his land with one or two pecks of ſainfoin ſeed; and produced better crops than were commonly raiſed from eight buſhels; and with this drill-plough he likewiſe ſowed wheat in equidiſtant rows, a foot aſunder, and hand-hoed it; and by this method, obtained better crops than common, and at a leſs expence. Some who appear deſirous of depreciating Mr. Tull, have

have pretended, that he was not the firſt inventor of the drill-plough, and that it was firſt invented, ſome ſay in Spain, ſome in Germany, and ſome in England, and for this they quote the Spaniſh Sembrader, Mr. Worlidge's drill-plough, Platte's ſetting-ſticks, and ſome others, all which were only propoſals; and a method that ſeemed deſirable to ſave ſeed: but there is no proof of any other inſtrument that really performed this at large in the fields; and what is of ſtill more conſequence, the great merit of Mr. Tull's huſbandry does not conſiſt in the drill-plough, though a very ingenious invention, but in the new method of culture introduced by him, as will plainly be ſhewn hereafter.

Having recovered his health, he returned to England, and ſettled upon a farm he had near Hungerford in Berkſhire, called Proſperous Farm, where he began his horſe-hoeing, or New Huſbandry, upon turneps and potatoes; which ſucceeded ſo well, that he extended it to wheat, upon part of a field, which he made very clean from weeds, and drilled it with wheat; but finding, that ridges were preferable, he laid his land up into ſix feet ridges, and drilled two, three, or four rows upon each ridge, ſeven inches diſtant: ſo that between the rows of each ridge, there was a ſpace or interval left, of about four feet, to be deep hoed with a plough, and the partitions between the rows were cultivated with the hand-hoe. This ſucceeded ſo well, that

he had good crops, ſome years four or five quarters upon an acre, from three pecks of ſeed, which was the greateſt quantity he uſually drilled upon an acre. The neighbouring farmers were ſurprized, to ſee ſuch crops raiſed from ſo ſmall a quantity of ſeed, and from only about a fifth or ſixth part of the land ſowed; and ſtill more ſo, that the ſame land produced ſuch crops every year, without fallow, reſt, or manure: but as they did not underſtand the principles of this culture, few of them attempted it: they are in general averſe to innovations in Huſbandry, and were ſo particularly in this caſe, as it was ſo different from the Huſbandry they had been accuſtomed to.

Mr. Tull however proceeded in this Huſbandry, and extended his wheat crops gradually from a part of a field, to one hundred and twenty acres.

In the mean time, ſeveral noblemen and gentlemen came, and viewed theſe wheat crops; and being convinced, that extending this Huſbandry would be very advantageous to the public, they perſuaded Mr. Tull to publiſh his method of culture; which he at laſt complied with, and printed it, firſt a Specimen in 1731, and an Eſſay on the Horſe-hoeing Huſbandry in the year 1733. He continued to cultivate wheat, in this manner, with ſucceſs, for thirteen years; and in that time made ſeveral improvements in his me-

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thod of cultivating wheat; which, together with anſwers to the objections, which he underſtood had been made to his Huſbandry, he publiſhed at different times, to the year 1739, which was about two years before his death: after which his Huſbandry was very little practiſed in England. The farmers did not come into it; and being alſo diſliked by the ſtewards and bailiffs of ſome noblemen and gentlemen, who had engaged in it, very few continued to practiſe it, after Mr. Tull's deceaſe.

But his Eſſay, or Method of Huſbandry, publiſhed in 1733, being tranſlated into French, M. du Hamel, a curious gentleman in France, began to try experiments in this Huſbandry; and he, and ſeveral of his correſpondents, being much ſurprized at the effect of horſe-hoeing wheat, they extended that culture to ſeveral other plants, which likewiſe ſucceeded; and their experiments fully confirm the principles of the New Huſbandry. Mr. Du Hamel collected and publiſhed theſe experiments in French, and Mr. Mills tranſlated them into Engliſh, which have induced many perſons in Britain to try this Huſbandry; and ſome of them have practiſed it extenſively in the fields, and for many years. As I had opportunity of knowing ſome of theſe, and to be well informed of others, by correſponding with the perſons who made them, I have in-

ſerted ſome of them, which are very valuable, in the following pages.

Many, who had neglected to practiſe the New Huſbandry from Mr. Tull's own ſucceſs, were prevailed with to engage in it upon the recommendation of theſe foreign gentlemen; and it is now making conſiderable progreſs among farmers, in the culture of beans, peaſe, and cabbages, and in ſome meaſure of wheat; but not much in the way of horſehoeing wheat, which, though the moſt profitable, is more difficult to perform well, than it is to drill and hand-hoe it. But they have found little difficulty in applying the horſe-hoeing culture to cabbages, particularly in the north of England; which indeed is ſo neceſſary to theſe plants, that, unleſs they are ſo cultivated, they would not anſwer to cultivate them atal l, for feeding cattle.

To have a juſt notion of the benefits of hoeing, it ſhould be obſerved, that land brought into fine tilth by the plough, as ſoon as the ploughing is finiſhed, it begins to ſettle, and continues to do ſo, as we have obſerved, till it becomes as cloſe and conſolidated as it was before it was ploughed: by which means, many of the roots of plants growing in ſuch ground are confined and unable to extend and ſpread in it, to collect nouriſhment for them. To prevent this in ſome meaſure, the land is dunged, and the dung, by fermenting in the ſoil, contributes to keep it open longer than it would

would continue ſo by the ploughing only; but this is attended with an inconveniency to the wheat, which is ſo much forced by the dung, that it grows too luxuariant in its infancy, and occaſions it to be rank, and apt to lodge; but having no new ſupply of nouriſhment, it is then apt to be blighted, and produce a ſmall crop of thin blighted corn.—Wheat is only a ſmall graſſy plant for five months, or more, after it is ſown; in all which time the earth is ſubſiding, and the virtue of the dung abating: ſo that afterwards, as the plants grow large, produce ears, and the corn advances to maturity, it ſtands in need of more nouriſhment than it did at firſt, but is in fact ſupplied with leſs; the conſequence of which is, that many of the plants die for want of proper nouriſhment, and the reſt are dwarfed or ſtinted: for it may be ſeen, while it is in bloſſom, that the ears of Lammas wheat are formed by nature to produce each ſixty, ſeventy, or more grains; yet the largeſt ears of broad-caſt Lammas wheat do not uſually produce more than forty grains of wheat, and, at an average, not half that number; as has been found, by examining a quantity of wheat in the ear before it was thraſhed.

The New Huſbandry for wheat differs from the Old in ſeveral reſpects: Firſt, with reſpect to dung, of which none is uſed in the New Huſbandry for that crop, but the earth

is not ſuffered to ſettle: for the ridges on which the wheat is drilled, are hoed before winter, as ſoon as the wheat has three or four blades, by ploughing a furrow from each ſide of the ridge, within two or three inches of the wheat, which remain ſo till the ſpring, till the wheat begins to ſpindle, and then the plough is run along in the ſame furrows that were made before winter; the plough now going deeper, and nearer to the rows of wheat, in order to plough away the earth hardened in the winter, that would now obſtruct the roots of the wheat from extending in the intervals. The earth is then ploughed up in ridges, and this has a ſudden and viſible effect on the wheat; cauſing it to grow luxuriantly, and of a healthy dark-green colour. The wheat is likewiſe now hand-hoed between the rows, and the two narrow ſlips of earth on the outſides of the wheat, which were left there by the hoe-plough. In this ſituation the land remains, till the weeds begin to advance; and then the earth, in the intervals, is again ploughed up to the rows, and the hand-hoe made uſe of between them; the rows are likewiſe hand-weeded, if neceſſary. If the wheat ſtands fair, it is again hoed with the hoe-plough, to and from the rows; and if any earth remains in the furrow between the ridges, it is turned up to them with the hoe-plough at two furrows; or with a double-mold board-plough, which performs it at one furrow,

furrow, and leaves a clear, open trench between the ridges. Thus the wheat has in all at leaſt ſix hoeings, and one of them ſhould be when the wheat begins to bloſſom, and another ſhould be done juſt after it has done bloſſoming: for by theſe hoeings, the wheat is made to blow ſtrong, and to fill the grain with flour. All the hoeings ſhould be performed when the earth is dry.—Mr. Tull directs ſo many hoeings, in his Book of Huſbandry publiſhed in 1733, being then his practice; but afterwards he altered his ridges, making them narrower, and then found four horſe-hoeings were ſufficient.

He drilled his wheat for ſome years upon ſix-feet ridges, and three rows upon each ridge: but the hoe-plough coming near the two outſide rows, they were improved ſo much more thereby, than the middle row was by hand-hoeing, that they were always remarkably more vigorous, taller, and fuller of corn, than the middle row. In order to make the middle row equal to each of the outſide ones, he raiſed his ridges higher in the middle, whereby the middle row had a greater depth of mould to ſpread its roots in; and then it was equal to the others. But he ſuſpected this was no advantage, and that the outſide rows, being deprived of the earth that was added to the middle, the produce of them was leſſened more than was gained by the middle rows, and upon trial he found it was ſo;

ſo; which determined him to leave out the middle rows entirely, and to drill only two rows upon a ridge. He then reduced his ridges from ſix feet to four feet and eight or nine inches broad, and drilled two rows upon each ridge, ten inches diſtant. In this way, the intervals between the double rows, to be hand-hoed, were near four feet wide; which is the proper room for a hoe-plough. In this method, he had better crops than before, and recommends it as the beſt. And his ſervants being now experienced in managing the hoe-plough, he found, that four horſe-hoeings were ſufficient for a crop of wheat; eſpecially as he could now hand-hoe the ten-inch partitions deeper than the former ſeven-inch ones.—After harveſt, all the preparation neceſſary for a new crop is, to plough up the earth in ridges upon the former intervals; which is eaſily done, commonly at four furrows, or ſix at moſt. This is one whole ploughing, and the four horſe-hoeings are equal to another ploughing, or two common ploughings in all to an acre of wheat.

It may ſeem very extraordinary, that a good crop of wheat can be raiſed upon ordinary land by ſo ſmall a quantity of tillage; and that good ſucceſſive crops of wheat can be raiſed by tillage alone, without any dung or manure, and without fallowing, or reſt: ſeveral circumſtances concur to produce this effect, the principal of which are the following:

1. In

1. In common broad-caſt ſowing, the land is ſeldom made ſo clean from weeds as it ought; nor can a broad-caſt crop be kept ſo clean as a hoed one; for which reaſon, the land ſown broad-caſt is much more exhauſted of the vegetable food: weeds, being natives of the ſoil, grow vigorouſly, and rob the corn of much nouriſhment, eſpecially ſuch of them as run to ſeed; which the weeds in hoed crops are not ſuffered to do, nor ever to grow large, much leſs run to ſeed, where the hoeings and weedings in the New Huſbandry are performed as they ought.

2. The land ſown broad-caſt is alſo exhauſted by four or five times the number of wheat plants more than the drilled; upon one is ſown ten or twelve pecks of ſeed, and on the other is drilled three pecks; or, on good land ſown early, but two pecks: theſe ſupernumerary wheat plants, and many weeds, greatly impoveriſh the land, in the common Huſbandry.—The land, it is true, is prepared by fallowing and manure; but, this being done before the ſeed is ſown, much of the effect of them is ſpent upon the wheat, while the plants are young and ſmall; but they have no freſh ſupply of nouriſhment when they grow large and want it moſt. This is an unfavourable circumſtance to ſown wheat, but the drilled is under a quite different management: for,

3. The

3. The drilled wheat, while young, requires only a ſmall ſhare of nouriſhment. It ſubſiſts then upon the vegetable food, remaining in the ſoil after harveſt, with what it receives from the firſt horſe-hoeing. This opens a furrow cloſe to the rows of wheat in autumn, whereby they are kept dry in winter, which is of conſequence to wheat. Ploughing the earth then from the rows, deſtroys the weeds in the intervals; and by turning and expoſing a large new ſurface, to the influences of the atmoſphere, the land receives a new ſtock of vegetable food. This is an important circumſtance, and peculiar to the New Huſbandry. The ſurface of the land at reſt, as before obſerved, is made fertile, by expoſure to the atmoſphere; but land that is turned up by the plough, being open and in tilth, is much more eaſily penetrated by the atmoſphere than hard, ſtale, land at reſt; and is quickly impregnated with the vegetable aliment, in the winter, by rain and froſt, and in ſpring and ſummer by the ſun and dews (for well hoed-land is as fine as garden mould), which in the hot weather fall plentifully in the night, and are imbibed by the fine ſpongy ſoil, as deep as the plough goes, which is deeper than the ſun exhales them in the day. Whether the dews are attracted to the finer parts of the ſoil, and communicated from thence to the roots, or whether the nutritious matter enters the earth, made

porous

porous by the hoeings, and is abſorbed immediately by the roots, may be doubtful; but certain it is, that the earth, by the hoeing and expoſure, is greatly enriched, to ſuch a degree, as to give ſufficient nouriſhment to the wheat; for the repeated annual crops of it have no other ſupply of nouriſhment.

Thick ſown wheat, that has the benefit of good tillage and manure, is apt to run too much to ſtraw, and though it grows high, has frequently but ſmall ears. Whereas wheat well hoed does not grow ſo tall, but tillers or branches much, from five to ten or fifteen ſtems riſing from one grain, and from ſome to a greater number; the ears are alſo almoſt twice the length of ſown wheat, and the grain much larger. The advantage of the New Huſbandry over the old, does not however conſiſt in the largeneſs of the crops of wheat (for they are frequently not greater nor ſo great as the ſown crops), but in the expence; the expence of a hoed-crop being commonly no more than about an eighth, and ſometimes no more than a tenth part of the expence of a ſown crop, upon the ſame land.

I have been particular in deſcribing the culture of wheat in the New Huſbandry; not only becauſe it is a valuable one to the farmer, but becauſe it requires more ſkill to cultivate it well, than any other crop of corn. Mr. Tull took great pains to bring it to perfection.

perfection. And whoever can cultivate a crop of wheat well, in this Husbandry, will not find much difficulty in raising other crops.

The old Husbandry not being usually conducted upon scientific principles, and the New being founded upon them, has been made an objection to it; because the objectors suppose, that common farmers cannot understand the nature of the food of plants, and in what manner they are nourished by it: but those who make such objections do not seem to understand the New Husbandry, wherein it is not necessary for farmers to be acquainted with these philosophical points. The curious, it is true, have endeavoured to determine them; but the operations of nature, are not the objects of our senses, and are too abstruse to be discovered by the most acute philosophers, who differ in opinion concerning the vegetable food or aliment, and in what manner plants are nourished by it: but the principal points necessary to be known are, whence that food is derived, and by what means it may be obtained. These are intelligible to farmers; they may know, that the air or atmosphere has an influence upon the surface of land that is exposed to it; that the air, sun, rain, dews, and frost, enrich land; that the more earth is broken, opened, and exposed, to receive these, the richer it will be; and that the roots of plants will receive the

the more nouriſhment from it; particularly if the means of obtaining and communicating that nouriſhment to them, is continued during the time of their growth as it is found to be by hoeing, and more eſpecially by deep or horſe-hoeing: this will be obvious to every farmer: for theſe effects are extremely obvious to every practiſer of this Huſbandry, who gives his land due tillage, hoeing, and expoſure. There are ſeveral methods of hoeing, performed by different inſtruments, and that have different effects. The firſt is the hand-hoeing, which is practiſed by all gardeners, and now known to moſt farmers. It is very uſeful to cut down weeds; but does not go deep in the ground; and for that reaſon the effect of it is but ſuperficial; particularly the Dutch hoe, which cuts off the tops of the weeds very near the ſurface, and this hoeing is called ſcuffing.—2. The hoe drawn by horſes, ſome of them intended only to kill the weeds, cutting the tops of them cloſe to the ſurface, as the ſhim or ſkim of Kent; which is a hoe made of a plate of iron, the fore part of which is made ſharp to cut the weeds. This and other plate hoes cut much in the ſame manner as the Dutch hoe; they ſcuffle the ſurface of the ground, but more expeditiouſly and cheaper, being drawn by a horſe. —Some are made to go deeper in the ground, as the nidget; which has three triangular ſmall hoes fixed in a frame: theſe go deeper in

in the ground than the ſhim, and ſerve to deſtroy the weeds and to break and pulverize the ſoil ſome inches deep; and in that reſpect are more beneficial than the plate hoes.—Others are made to go deeper in the land, in the manner of harrow tines; theſe pull out weeds, and ſtir the ground deeper than the nidged; but do not kill the weeds ſo effectually as the plate hoes—One of the Gentlemen abroad, the very ingenious M. De Chateauvieux, who practiſed the New Huſbandry, invented a long triangular hoe, larger than thoſe in the nidget, which ſtirs the ground deeper, but goes wholly under ground, and raiſes the mould as it paſſes along; and as ſoon as it has paſſed, the mould ſinks down again, where it was before. This inſtrument he named the *Cultivator*.—Theſe and other inſtruments, drawn by one or two horſes, are by ſome called horſe breaks, cultivators, and horſe hoes. But the horſe hoe is properly a plough; and hoeing with a plough, is properly the New Huſbandry, and ſhould be ſo named to diſtinguiſh that huſbandry from all other methods of tillage.

The inſtrument made uſe of for horſe hoeing, is a plough, by ſome made with ſhafts, but this is not neceſſary. The ſwing plough, called the Rotheram, or patent plough; or the common ſwing plough, made uſe of in Middleſex, Surry, and ſome other counties near London, are proper for horſe hoeing. A ſmall ſwing plough, without wheels, and having a notched

notched bridle, at the fore-end of the beam, to make the plough go more or leſs deep, and to give more or leſs land, viz. to cauſe the plough to go more or leſs to the right or left, is the inſtrument proper for horſe-hoeing. This plough is familiar to ploughmen in ſeveral counties, (and the common ſwing-ploughs will do for this purpoſe, ſo as they are not too clumſy), and provided the earth-boards, &c. ſtand a few inches higher than common, is convenient in trench-hoeing, viz. when the plough is drawn twice in the ſame furrow, to make it deeper; for then a high earth or mould-board turns all the earth fairly over to the right, and prevents any or moſt of it from running back towards the left ſide.—The turning of the furrow expoſes a new and double ſurface to the immediate action of the atmoſphere: this is neceſſary, that theſe ſurfaces may receive the inriching influences thereof, the air, ſun, dews, rain, &c. as deep as the hoe-plough goes; which, in trench-hoeing, is to the depth of two common furrows, and greatly enriches the land through the whole ſubſtance of it; the ſurface being changed at every horſe-hoeing.—Theſe advantages of depth and expoſure are peculiar to this method of hoeing, which is properly the horſe-hoeing, or New Huſbandry; no other method of hoeing is of equal advantage to the crop, or to the land. They are only ſo

far beneficial, as they approach nearer to the horſe-hoeing.

Another inſtrument made uſe of in the New Huſbandry is, a double mould-board or earth-board plough, with which furrows between the ridges are deepened at laſt, and which clears the earth out of theſe furrows, throws it all up to the ridges, and leaves a clear, deep trench or furrow between the ridges; this it does at one draught or furrow, that would require two furrows of the hoe-plough. The earth-boards of this plough ſhould be made pretty high, that they may throw all the earth up to the ridges on each ſide: and it would be convenient to make the two mould-boards moveable, to be ſet wider or narrower one from the other, becauſe the ridges are not always equally diſtant; and, by means of the mould-boards being moveable, the earth may be thrown up higher or lower upon the ridges. This plough may have two ſmall fins, one on each ſide of the ſhare, and is uſeful in the Common Huſbandry, to open furrows in level ground, into which beans or potatoes are to be dropped, and afterwards covered with a harrow or hand-hoe. Theſe two ploughs being uſeful in the Common Huſbandry, and not peculiar to the New, are not properly chargeable to the New alone.—The only inſtrument of conſequence, peculiar to the New Huſbandry, is the drill-plough, whereof Mr. Tull's is the beſt yet commonly uſed;

uſed; and is alſo cheap, if the ſeed-boxes are made of hard wood. A very ſhort ſtone-roller, plain or fluted, is alſo ſometimes very uſeful to be drawn along between the ridges in ſtrong land, to break the clods there in very dry weather; which it will do very expeditiouſly, reduce them to powder, and make the earth fine, and in order to be turned up to the ridges. Such a roller may be drawn in a frame with ſhafts, by which it is drawn by one horſe.

Though the New Huſbandry promiſes many advantages to the judicious practiſers of it, and to the public, it has not eſcaped the cenſures of the prejudiced; but it has been cenſured chiefly by thoſe who were not practiſers, or did not perfectly underſtand it. Of theſe I ſhall mention only a few late inſtances.

Mr. Harriſon, author of the Farmer's Complete Guide, recommends the Old Huſbandry in general, and condemns the New. He has borrowed a great deal from Mr. Young, who recommends it for beans, and gives the following example of it.—Three half-acres of the ſame land were ſown with tick-beans, broad-caſt, each with one buſhel of beans; and one of theſe half-acres was twice hand-hoed. The other half-acre was laid up in five-feet ridges, drilled with three pecks of beans, three rows of ſeed, at a foot diſtance, upon each ridge. Theſe had three hand-hoeings, and were four times horſe-hoed.

	Buſhels.	Pecks.
The broad-caſt half-acre, not hoed, produced,	4	1
The half-acre, ditto, hand-hoed, produced	8	2
The half-acre, drilled and horſe-hoed, produced	13	2

We have here an inſtance, that the New Huſbandry is not generally known in England, even by curious farmers. Mr. Tull drilled ſix feet ridges with three rows of wheat; but upon narrower ridges he drilled but two rows, at ten inches diſtance. It was therefroe very improper to drill three rows upon five ridges, of ſuch large plants as beans. The two partitions between the rows, of one foot each, which was hand-hoed, took two feet breadth of the ridge, in the deepeſt part of it; and only three feet, viz. a foot and an half on each ſide of the ridge, remained to be horſe-hoed, being the ſhalloweſt part of the ridge. The middle rows were not likely to receive much benefit by horſe-hoeing ſuch ſmall quantities of earth on the ſhallow outſides of the ridges; and had little more aſſiſtance than what it received from hand-hoeing, which undoubtedly leſſened the crop.—To have ſeen the full effect of horſe-hoeing, there ſhould not have been a middle row upon ſuch narrow ridges. When Mr. Tull ſowed three rows of wheat upon ſix-feet ridges, the middle rows were remarkably ſhorter and poorer than the outſide rows, though the partitions

titions between the rows were but ſeven inches each, and the hoe-plough came five inches nearer to the middle rows of wheat on each of them, than it did to the middle rows of the beans; which ſhews the impropriety of drilling three rows upon five-feet ridges.—Here Mr. Young adds, "that, on a "general ſurvey of experiments, carried much "further than the foregoing, it appears that "the face of the matter is not altered, but "ſtill bears the ſame complexion, with re-"gard to the different methods of ſowing "abovementioned. In a courſe of no leſs "than nine experiments, the drilled beans "have been found, after the payment of all "expences, to be ſuperior to the broad-caſt "by full two pounds and three ſhillings per "acre, beſides the difference of the land being "left in ſo much better heart by the latter "than the former. The ſuperiority of the "drill culture, as a preparation for wheat or "barley, I do not think can be eſtimated at "leſs than fifteen ſhillings per acre. Here is "a ſuperiority of near three pounds an acre, "in favour of drilling. Is it not evident, "that this, in a large piece of ground of clay "or loam, will amount to ſome hundreds of "pounds per annum?"

Several other experiments are related by Mr. Harriſon, alſo from Mr. Young, intended to ſhew, that in other crops, the Old Huſbandry is much ſuperior to the New. It would

be unfair to ſuppreſs the evidence ariſing from experiments, as they are our ſureſt guides, in determining the merits of every mode of huſbandry; and no perſon, who impartially enquires after truth, will decline to allow the full force of ſuch evidence. But it is neceſſary that the experiments be related particularly, which is not done here, except in one inſtance of a comparative experiment of both ſorts of huſbandry, and continued for four years, viz. 1764 to 1767, both incluſive, which we ſhall conſider.

The BROAD-CAST HUSBANDRY.

		Expences. l. s. d.	Products. l. s. d.		l. s. d.
1764	Turnips	2 17 0	28 Tons	1 11 4	Loſs 1 6 4
1765	Barley	2 5 11	33 Buſhels	4 19 0	Profit 2 13 1
1766	Clover	1 17 11	3 Tons 19 C.	6 12 0	Profit 4 14 1
1767	Wheat	2 11 10	20 Buſhels	5 14 0	Profit 3 2 2
		9 12 8		18 16 4	10 9 4
	Average	2 8 2		4 14 1	2 12 1

The HORSE-HOEING HUSBANDRY.

		Expences. l. s. d.	Products.		l. s. d.
1764 1765	Fallow Wheat	5 13 2	26 Buſhels	Profit	1 3 4
1766	Wheat	3 14 7	13 Buſhels	Profit	0 3 5
1767	Wheat	3 17 10	9 Buſhels	Loſs	1 3 10
		13 5 7	48 Buſhels		0 2 11
	Average	3 6 4	42 Buſhels	Profit	0 0 8¾

It

It was formerly the general cuſtom to fallow land, intended for wheat, every third or fourth year, and in many places it is ſo ſtill: but of late years ſeveral farmers ſubſtitute a hoed-crop of turnips or beans, or a crop of clover, inſtead of a fallow; and by that means they get a crop in the fallow year, and ſave the expence of fallowing. This is a valuable improvement in the Old Huſbandry; and with this improved Huſbandry the horſe-hoed wheat crops are here compared. In a compariſon of two methods of Huſbandry, the trial that is to determine the merit of each ſhould be fair and equal, which here it is not; a crop of turnips, obtained the fallow year, is allowed by all to be profitable to the farmer; and, if ſo, ſhould not the New Huſbandry have that benefit as well as the Old? But inſtead of this, the Old Huſbandry has here the advantage of a crop of turnips the firſt year, and the New Huſbandry is charged with the expence of a fallow, or has no advantage that year. It is true, the crop of turnips is charged as a loſing one, and would be really ſo to appearance ſome years, when the farmer is obliged to give the turnip-land two or three ploughings, harrowings, and ſeed, extraordinary, on account of the turnips being repeatedly deſtroyed by the fly: but in the years when that accident happens, and that the expence and rent exceed the value of the turnips, they are not even in ſuch years unprofitable, be-

cauſe the repeated ploughings and harrowings for the turnips improves the land and following crops. We are not indeed informed of particulars, and from what circumſtance it happened that this turnip-crop was a loſing one; which ſhould not have been omitted.

There is the ſame objection to the other articles, which, had they been related particularly, the reaſons of the ill ſucceſs of the New Huſbandry would have been ſeen; for I ſhall produce ſeveral unexceptionable examples of the ſucceſs of the New Huſbandry, and the great profit of ſucceſſive hoed crops of wheat, for many years, on large tracts of different ſorts of land.

But even in the general manner, in which theſe horſe-hoed crops of wheat are ſtated, it will be very apparent to thoſe who underſtand the New Huſbandry, that they were not cultivated in the proper manner, according to that Huſbandry.—For here the expences of the ſecond and third crops of wheat (wherein no fallow is concerned) one of them is charged at 3 l. 14 s. 7 d. and the other at 3 l. 17 s. 10 d. which are much beyond the real expence of horſe-hoed wheat crops, whereof the tillage and ſeed is not above fourteen or fifteen ſhillings per acre, and of all expences, harveſt-home, they do not commonly exceed ſeventeen ſhillings per acre. Now, if the rent of this land was ſo high as eighteen ſhillings per acre, and that was included in this charge, the

expence

expence might then amount to 1 l. 15 s. but this is not ſo much as is charged here by near two pound per acre. What then are we to think of this experiment, brought to determine the merit of the New Huſbandry; where, inſtead of about 1 l. 15 s. per acre, which is the higheſt expence it would really coſt, it is charged at 3 l. 14 s. 7 d.?

Another remarkable circumſtance in this experiment is, the decline of the drilled wheat crops; which the firſt year was twenty-ſix, the ſecond thirteen, and the third but nine buſhels per acre. This, as will be ſhewn hereafter, is very different from the crops of the cultivators, experienced in this huſbandry, which are greater than the firſt of theſe, and do not decline as they did here; but, on the contrary, the laſt crops at the end of twenty years are as good, and frequently better, than at firſt: for this culture duly performed improves the land without manure, though it produces every year a good crop of wheat.—Probably theſe drilled wheat crops were managed no better than the bean crops above-mentioned were; three rows upon five-feet ridges, and horſe-hoed only four times: but there ſhould not be more than two rows of wheat upon each ridge, with a partition of about ten inches, and the ridges four feet eight or nine inches. Experience has proved four horſe-hoeings ſufficient to obtain good ſucceſſive crops from ordinary land thus laid

out

out and cultivated. How this land was laid out and cultivated, we are not told, which ſhould not have been omitted in the deſcription of experiments that were to decide the merit of any mode of Huſbandry.—When the experimenter found that the crop declined, he ſhould have given the land five or ſix horſe-hoeings, as the author of this Huſbandry directs, which would have improved the land: and he ſhould have beſtowed ſome manure upon it, as a hand-dreſſing in the ſpring. But here it will be ſaid, that the author diſclaims the uſe of manure for the horſe-hoed wheat; which has often been ſaid by thoſe who are prejudiced againſt this Huſbandry. But the fact is otherwiſe, the author directs ſome manure to be uſed for drilled wheat in ſuch caſes. As in the preface to his Huſbandry, p. 4. "There may," ſays he, "be ſuch wet "clayey land, which the plough cannot pul-"verize without help of the ferment of dung. "And in any ſort of land, when it is ſuſ-"pected that the earth of the partitions was "not well ordered in the ſummer, the beſt "remedy is, to ſtrew a ſmall quantity of "malt-duſt, or other fine manure, upon the "rows, about the month of February; this "will ſtrengthen the plants, and enable them "to ſend their roots into the interval the ear-"lier in the ſpring." This appears to have been wholly omitted; and likewiſe to give the land any more than four horſe-hoeings, though

four

four was the number given, when only two rows of wheat were drilled on each ridge; but, when three rows were drilled upon each, it was the author's practice to horſe-hoe his wheat ſix times; and he directs, that wheat ſown in that manner ſhould be hoed ſo often, or in proportion to its poverty.—And therefore, inſtead of concluding with Mr. Harriſon, p. 406, that this experiment is deciſive in favour of the Old Huſbandry; we may conclude with certainty, that it was not an experiment in the New Huſbandry, but in a method different from it, in ſeveral eſſential circumſtances: and therefore proves nothing, but the experimenter's ignorance of the New Huſbandry.

We have ſeen, that Mr. Harriſon acquieſced in the experiment upon beans (though badly performed), though in favour of the New Huſbandry. If the principles upon which the culture of beans ſucceeded are right, why ſhould not the ſame culture ſucceed when applied to wheat and other plants. He makes no reflection upon this; but, as others have done, proceeds to condemn the New Huſbandry, though unacquainted with it, and without any experience of it: for it does not appear that he has made any trial of it himſelf.

It is obſervable in ſome modern writers of agriculture, who depretiate the New Huſbandry, that they do not found their arguments upon

upon their own experience, and a practice of that Huſbandry for a ſeries of years, and on any conſiderable extent of land of different ſorts; which without doubt is neceſſary, to form a true judgement of the merit of any Huſbandry; but being prejudiced againſt this, they are eaſily confirmed in their prejudices, and endeavour to perſuade others, by referring to ſuch ſmall detached trials as are too ſuperficial to convince any who are unprejudiced, eſpecially in a matter of ſuch conſequence, that ſo greatly concerns the public. Very different from this was the conduct of the ingenious author of the New Huſbandry; he diſcovered, in the culture of the vines, what the cultivators of them had not perceived for ages, but did not endeavour to ſupport his opinion by ſmall detached experiments; but, finding his ideas confirmed by trials upon turnips and potatoes, he began trying the ſame upon wheat; part of a field at firſt, and by degrees extended the ſame to great part of his farm, till he had annually from a hundred to one hundred and twenty acres of horſe-hoed wheat; he applied the ſame culture to ſuch other plants as ſuited his land, barley, peaſe, and ſainfoin. He publiſhed his Huſbandry at laſt, at the ſollicitation of many who ſaw his ſucceſs; and he was a gentleman of ſuch acknowledged probity, that thoſe who were prejudiced againſt his Huſbandry did not preſume to queſtion his veracity. It is therefore very unfair

unfair of thoſe who pretend to determine upon the merit of this Huſbandry, that they take no notice of his extenſive and ſucceſsful practice of it for many years; but refer their readers to a few ſmall trials, improperly conducted, and which prove nothing, but that the experimenters were unacquainted with the principles and the approved practice of this culture.

The ſame ignorance or inattention is obſervable, with regard to the experiments in this Huſbandry made abroad by M. Duhamel and many of his ingenious correſpondents; who, purſuing Mr. Tull's directions, found them ſucceed in a manner that much ſuprized them; and their experiments have long ſince been publiſhed in Engliſh. They ſucceeded remarkably in the culture of wheat, and other corn; alſo of lucerne, ſainfoin, turnips, carrots, and other garden-plants, lettuce, aſparagus, &c. of hemp likewiſe; and remarkably in the culture of vines, much beyond what they attained to from the method of culture for vines common in that country. Is it not therefore very extraordinary, that ſome inconcluſive trial upon a few perches of wheat ſhould be referred to as of conſequence, and not the leaſt notice taken of thoſe extenſive ones, upon ſuch a variety of plants, whereof ſome only are here mentioned, and in general ſucceeded, as the experimenters declare, much beyond

beyond their expectations, though they expected much from the author's own ſucceſs, related in his eſſay?

A late anonymous writer, the author of the *Farmer's Kalendar*, has endeavoured to ſhew, that the principal or only benefit of tillage, and hoeing, is to deſtroy weeds; and that manures are the farmer's only dependence to enrich and improve his land.

This he expreſſes in the introduction to his work as follows.

"About fifty years ago, a celebrated *Engliſhman*, *Mr. Tull*, made many experiments, "in a new method of culture, the great deſign "of which was, to ſet aſide the uſe of manures. "To this day he has had many followers. "With the gentlemen that purſue his ſyſtem, "tillage alone is neceſſary,—the plough is all "in all; and nothing is to be dunged or "otherwiſe dreſſed, but meadows or paſtures. "Were ſuch ideas to become general, it is "inconceivable how much miſchief they "would occaſion: for there cannot be more "falſe principles, than thoſe whereon they are "built. Throughout theſe ſheets, care is "taken, to keep clear of ſuch errors; the "great importance of manures is duly attended "to, and the farmer well inſtructed how to "raiſe as much as poſſible himſelf. This "point of Huſbandry can never be too much "attended to, nor can any have been more "neglected, by the generality of writers:

" indeed except by one or two (who it muſt be " owned have treated it in a very maſterly " manner) they have not thought it worthy " their attention."

In diſquiſitions on controverted points, thoſe eſpecially of importance, every writer ſhould adhere ſtrictly to facts, or ſpeak cautiouſly where he is not certain of them. Mr. Tull publiſhed his Huſbandry in the year 1733, wherein he does not ſet aſide the uſe of manures, but in particular circumſtances, and in the culture of particular plants; neither does he, or his followers, limit the uſe of dung and other dreſſings, to meadows and paſtures only. He cultivated chiefly wheat and turnips in the horſe-hoeing way; and he manured his turnips, and recommends that practice to others: but to ſhew particularly that this author has miſrepreſented his ſyſtem, I ſhall recite the account he gives of it in his own words.

Page 19. " But though dung be, upon " theſe and other accounts, injurious to " the garden [giving the roots, &c. a bad " taſte] yet a conſiderable quantity of it " is ſo neceſſary to moſt cornfields, that, " without it, little good can be done by the " Old Huſbandry. Dung is not injurious to " the fields, being there in leſs proportion. " And ſuch plants as cabbages, turnips, " carrots, and potatoes, when they are de- " ſigned only for fattening of cattle, will not

" be

" be injured by dung, tillage, and hoeing all " together; which will make the crops the " greater, and the cattle will like them never " the worſe.

" Common tillage alone is not ſufficient " for many ſorts of corn, eſpecially wheat, " which is the king of grains. Very few " fields can have the conveniency of a ſuffi- " cient ſupply of dung, to enable them to " produce half the wheat theſe will do near " cities where they have plenty of it: the " crop of twenty acres will ſcarce make dung " ſufficient for one acre, in the common way " of laying it on. Under the name of dung, " we may alſo underſtand whatever ferments " with the earth, except fire, ſuch as green " vegetables covered in the ground, &c. " Dung without tillage can do very little; " with ſome tillage doth ſomething; with " much tillage pulverizes the ſoil, in leſs " time than tillage alone can do: but the " tillage alone, with more time, can pul- " verize as well."

Page 211. " Though dung is ſo neceſſary in " the old *Virgilian* raftering, and *ſat erit* Huſ- " bandry; yet to moſt ſorts of land, uſed in " the old and new pulverizing Huſbandry, it " is not neceſſary; as it appears by mine, " and by the experience of all farmers, who, " being emancipated from Virgilian prin- " ciples, have made proper trials. They find, " as well as I, that dung may be ſupplied,

" by

" by an encreaſe of tillage. But I never " have ſaid any thing againſt the uſe of dung " in the corn fields, except where it cannot " be procured at all; or when the whole " expence of it is likely to exceed the profit. " It is probable, that in ſome places, dung " may be had at a leſs price, than the encreaſe " of tillage neceſſary to ſupply the quantity of " dung required. That dung may be uſeful " when properly applied, I believe was never " denied by any author.

" The Virgilian Huſbandry [of burning " the land, &c] being ſhewn, its oppoſite is, " not to pulverize land by fire, nor put truſt " in dung and harrows, to ſupply the place of " the plough; but, on the contrary, to give " to every ſort of land, proper and ſufficient " tillage (the pooreſt requiring moſt), and to " uſe only what dung we have, or can rea- " ſonably get, in the propereſt manner, is " that Huſbandry which I call Antivirgilian, " of which my horſe-hoeing ſcheme is a " ſpecies."

He ſays likewiſe, in the preface to his eſſay, written ſix years after he began the horſe-hoeing of wheat: " The particular ſcheme " of raiſing conſtant annual crops of wheat, " without dung or fallow, is as yet only upon " probation: but by the ſix crops I have had " in that manner, I ſee nothing againſt their " being continued. This, it is true, requires " greater care in the management, than any

"other branch of the Husbandry: but he "who can do this without dung or fallow, "may easily do it, with one or both of them. "And there may be such wet clayey land, "which the plough cannot well pulverize, "without help of the ferment of dung. And "in any sort of land, where it is suspected "that the earth of the partitions was not well "ordered in the summer, the best remedy is "to strow a small quantity of malt dust, or "other fine manure, upon the rows, about "the month of February. This will strengthen "the plants, and enable them to send their "roots into the intervals the earlier in the "spring."

Here we see, that Mr. Tull does not set aside the use of manures. He agrees that dung is beneficial for crops of turneps, cabbages, carrots, potatoes, and such vegetables as are cultivated for cattle; that dung is absolutely necessary for corn and other crops in the old Husbandry; and that dung and other manures are to be used, where they can be had at a less expence than the tillage proper for hoed crops. From these passages and others in his book, it is evident, that he does not say, as the above-mentioned author asserts, "that "nothing is to be dunged, or otherwise "dressed, but meadows or pastures." His principal crop was wheat, for which he said dung was not necessary, in the hoeing culture;

culture; and this he ſaid upon good grounds, as will afterwards be ſhewn.

The above author, in ſeveral places, endeavours to eſtabliſh an opinion, that the only uſe of fallowing is to deſtroy weeds; that the land is thereby pulverized, but not benefited by the atmoſphere. This he particularly inſiſts upon, p. 294, as follows: ſpeaking of fallowing, he ſays;

"The autumnal tillage is abſolutely re-
"quiſite, for the mere work of killing weeds,
"without recurring to the attraction of any
"beneficial particles from the air. The latter
"effect may appear very equivocal to a com-
"mon farmer, never uſed to conſider things
"deeper than firſt appearances. Unhappily
"this is a part of Huſbandry, on which we
"can only ſpeak from idea, and not in the
"leaſt from experiment. Of all the volumes
"that have been publiſhed on Huſbandry,
"none gives one a clear proof, of the ac-
"quiſition of manure from the atmoſphere.
"The benefit of fallowing is no clear proof;
"becauſe it is never experienced excluſively
"of killing weeds; and unleſs ſuch effects
"were known diſtinctly, one cannot with
"any preciſion attribute a certain degree to
"each. As experiment has not and probably
"will not prove this important point, it re-
"mains for the diſquiſition of reaſon alone,
"which may adopt whatever ideas appear
"moſt juſt to individuals. There are many

" arguments to be produced, to ſhew, that " the great benefit of fallowing, at whatever " ſeaſon, is the deſtruction of weeds, and mere " pulverization, without any reference to ſup- " poſed acquiſitions from the air: a ſtrong " one is the equality of crops that ſucceed " complete fallows and other crops: the " latter, if ſufficient care has been taken to " deſtroy the weeds, are generally as good as " ſuch as follow compleat ſummer fallows. " Wheat, for inſtance, after beans well hand- " hoed, is as good: after peaſe, if a great " crop, the ſame, without any hand-hoeing at " all; after clover alſo, in which the land is " bound, and matted together with roots: " and the great fertility of new-broken-up " graſs lands, ſhould look, as if the very con- " trary ſtate to fallowed lands was moſt be- " neficial. Many writers talk of the benefit " of thick ſhade, and the putrid fermentation " of thick and luxuriant crops. It may be " all very true; but ſurely the whole is " founded on principles extremely different " from the acquiſition of aërial benefit by " fallowing! I know of none in which they " agree, but the killing of weeds.

" The acquiſition of nitre, ſay ſome, is well " known to be greatly effected, by land being " ploughed on to the ridge in winter; and " nitre, ſay others, is the principle of vege- " tation. This fact, of nitre being ſo very " beneficial, ſeems rather to be a deduction of

" reaſon,

" reaſon, than an experimental proof. Salt-
" petre, in every application, has often been
" proved rather poiſonous than beneficial.
" Why, therefore, ſhould we ſuppoſe it of
" ſuch conſequence in the air? I am by no
" means *aſſerting* the contrary; but only ex-
" preſſing doubts of thoſe maxims, which do
" not ſeem to have had experiment for their
" foundation. Let us, for theſe various rea-
" ſons, be contented with recommending au-
" tumnal ploughing to the huſbandman, on
" principles that he can underſtand, and
" effects which are viſible to him, pulveriza-
" tion, and the killing of weeds: and not
" perſuade them to the practice, for reaſons,
" which are *Greek* and *Hebrew* to them."

Here the author has given the ſum of his objections to the New Huſbandry, relative to the effects of the atmoſphere. " Of all the " volumes, ſays he, that have been publiſhed " on Huſbandry, none gives one a clear proof " of the acquiſition of manure from the at-" moſphere." This is a very extraordinary aſſertion. It is founded upon what he ſaid before, " Unhappily, this is a part of Huſ-" bandry, on which we can only ſpeak from " idea, and not in the leaſt from experiment." But how does this conſiſt with what he ſaid in the introduction, " that a celebrated Engliſh-" man, Mr. Tull, made *many experiments*, in " a new method of culture, the great deſign " of which was to ſet aſide the uſe of

" manure?" But was not his deſign likewiſe to prove by theſe experiments, the acquiſition of manure from the atmoſphere? and how then can this author ſay, that we cannot in the leaſt ſpeak of this part of Huſbandry from experiment? is not this a very diſingenuous manner of treating the author of theſe experiments, and the ſubject, he and others have ſince treated upon: and have not they publiſhed their experiments, to prove, that the earth is fertilized by the atmoſphere? and that they have proved it, we ſhall demonſtrate. This author recommends to the farmer, " autumnal ploughing, on principles " that he can underſtand, and effects which " are viſible to him, pulverization, and the " killing of weeds." What is the farmer to underſtand by pulverization? He knows that ploughing breaks or pulverizes the land; it is a mechanical action, that adds nothing to the ſoil, adds no new matter to it: on the contrary, by opening the ſoil, it is made more pervious to the roots of plants to exhauſt it; conſequently, the more land is ploughed and fallowed, the more it is liable to be impoveriſhed by the next crop. How then is the land to recover its fertility? This author tells the farmer, that this is to be done by dung and manure; but he alledges, that Mr. Tull's deſign was to ſet aſide the uſe of manure; ſhould he not have informed the farmer, what ſucceſs he had in this deſign? That

That he cultivated wheat without manure, for thirteen years; that he raiſed ſucceſſive crops of wheat, every year during that time, upon very ordinary land; that he obtained good crops, of four quarters and upwards, without manure, and without impoveriſhing his land; and that many perſons abroad had practiſed his method with ſucceſs? How will the author excuſe his concealing this from the farmer? It is a matter of great importance in Huſbandry, and merits the particular attention of every cultivator of land.

Mr. Tull, the author of the New Huſbandry, cultivated a part of his eſtate near Hungerford in Berkſhire, and there introduced the method of horſe-hoeing, which he practiſed chiefly upon wheat and turnips. His land was in general a light, poor ſoil, which he deſcribes as follows, p. 227, and 263.

"The bulk of the land belonging to this "farm is, on the ſouth ſide, for near a mile "in length, always called *Bitham Hills*, and "are, for the moſt part, declining grounds, "a ſort of *graciles clivi*, being all on a chalk. "In dry weather the whole ſtaple looks of a "white colour; it is full of ſmall flints, and "ſmaller chalk ſtones. Below theſe hills is "a bottom, where are ſome grounds, upon a "chalk alſo, but had not then [when his "Eſſay was publiſhed] been uſed in hoeing, "having lain with ſaint foin thirteen or four-"teen years. On the weſt ſide, all the land

" is called *Eaſt Hills*, being on the eaſt of the " farms to which they all formerly belonged. " On the norrh-weſt ſide, is a high field, " called *Cook's Hill*, and is the only field of my " farm that is not upon a chalk. It is a " very wet ſpewy ſoil, of very little value, " until I made it dry, by ploughing croſs the " deſcent of the hill. This ſoil is all too " light, and too ſhallow, to produce a tole- " rable crop of beans. This farm was made " out of the ſkirts of others. Great part of " the land was formerly a ſheep down; and " whilſt the whole was kept in the Virgilian " management (uſual for ſuch land), it had " the full reputation of poverty. The higheſt " part of it uſed to be ſown (as I am well " informed) with oats once in two or three " years, upon the back [once ploughing], " and if the ſummer proved dry, the crop " was not worth the expence of that once " ploughing. The generality of farmers, " were then of opinion, that if this ſhould be " thoroughly tilled and pulverized, it would " become ſo light, that the wind would blow " the ſtaple away; but the contrary happened, " for it being ploughed *five* times inſtead of " *once*, it produced good barley and other " corn, and never has returned to its former " degree of lightneſs ſince; and this was " above fifty years ago. And now tillage " and foreign graſſes are come into faſhion, " incloſed lands, that do not *rot* ſheep (as

" not

" not one foot of mine is wet enough, or rich " enough to do) are become of greater value " than formerly.

" My farm was termed a *barley farm*, not " from the good crops of barley it produced, " but becauſe the land, being almoſt all hilly, " was thought too light for wheat. In a dry " ſummer, the barley crop failed for want of " moiſture, and of more pulverization, and " was not worth half the expence.

" Land is ſeldom too dry for wheat; and " this dry ſoil, in the hoeing culture, brings " very good crops of wheat, which is the " reaſon I have now no barley except what " is ſown on the level; as it always muſt be " for planting ſaint foin and clover amongſt " it; were it not for that purpoſe, I ſhould " plant no barley at all."

Upon this unpromiſing ſoil for wheat, Mr. Tull began his horſe-hoeing Huſbandry; firſt upon one field, and afterwards upon the reſt of his land, ſtill encreaſing the quantity, till at laſt he had one hundred and twenty acres, drilled with wheat, and horſe-hoed; and part of theſe was annually under wheat crops, in ſucceſſion for thirteen years, without reſt, change of crops, fallow, dung, or any kind of manure, during that time; and the land notwithſtanding was not impoveriſhed, but improving.

This he takes notice of in ſeveral places, particularly in the thirteenth year, p. 273,

where he ſays, "My field, whereon is now "the thirteenth crop of wheat, has ſhewn, "that the rows may ſucceſsfully ſtand upon "any part of the ground. The ridges of this "field were, for the twelfth crop, changed "from ſix feet to four feet eight inches: in "order for this alteration, the ridges were "ploughed down, and the whole field was "ploughed croſs-ways of the ridges, for "making them level; and then the next "ridges were laid out the ſame way as the "former, but one foot four inches narrower, "and the double rows drilled on their tops; "whereby of conſequence there muſt be ſome "rows ſtanding on every part of the ground, "both on the former partitions, and on every "part of the intervals. Notwithſtanding "this, there was no manner of difference in "the goodneſs of the rows, and the whole "field was in every part of it equal, and the "beſt, I believe, that ever grew on it. It "has now the thirteenth crop, likely to be "very good, though the land was not "ploughed croſsways.

"The crop of the ſix ſcore acres of wheat, "that was growing at the time of publiſhing "my addenda, was much greater than the "crop the year before it, and would have "produced more grain in proportion, if the "heavens had been as propitious: but the "heavy rains that fell, when the firſt planted "was in bloſſom, diminiſhed the filling of

"the

" the ear, and its grain; yet not ſo much as " of moſt ſown wheat, eſpecially of the very " early ſown, which generally eſcapes the " beſt in this common calamity. The burn- " baked wheat being always early ſown, I am " informed, had next to no grain in it; and " this is the moſt expenſive ſort of Huſbandry, " the tenants pay ſuch exorbitant fines for " the liberty of ploughing this land."

From theſe experiments, and the ſucceſs of horſe-hoed wheat upon the author's whole farm, we muſt conclude, that land is enriched from the atmoſphere: for it is evident, that this land had no other aſſiſtance; and yet, though poor, or very ordinary land, continued year after year, without intermiſſion, to produce good crops of wheat, that are acknowledged to be exhauſting crops; ſo exhauſting, that no good farmers will venture to ſow wheat on the ſame land, for only two years ſucceſſively, without manure; nor with manure, unleſs the land has an intermediate fallow, or a change of ſome meliorating crop: ſo that horſe-hoeing appears here to be ſuperior to manure.

This fertility can be attributed to nothing elſe but the atmoſphere, and to this Mr. Tull does attribute it: for, ſays he, p. 63. " If it " ſhould be demanded, from whence the ſoil " can be ſupplied with vegetable matter, to " anſwer what is carried off, by theſe conſtant " crops of wheat, that the land be not con-

" ſumed

" ſumed by them; the ſoil, in this our caſe, " cannot be ſupplied in ſubſtance, but from " the atmoſphere"—and then he proceeds to ſhew, that this ſupply is from rain, dews, &c.

After a thirteen years experience of horſe-hoeing wheat, Mr. Tull concludes; " the " ſame ſix ſcore acres, that was wheat the laſt " year, is planted with wheat now, and is " all of it as ſtrong, and likely for a good " crop, as in any of the former years; though " there is but about one acre of it dunged. " The whole is the freeſt from weeds before " hoeing, that ever was ſeen, and the ſown " wheat of the neighbourhood the fulleſt " of them.

" I can ſhew at this inſtant, one of the ex-" periments I have recommended, which " though it be on leſs than two perches of " ground; yet muſt convince every man who " has ſeen it (and doth not renounce the evi-" dence of his reaſon and ſenſes) that pulve-" rization by inſtruments can vaſtly exceed " the benefit of common manure.

" It is to ſuch experiments, that I leave the " progreſs of my horſe-hoeing Huſbandry; " aſſuring the publick, that in all my practice, " which is now thirteen years, I have never " met with one inſtance, that gives me the " leaſt ſuſpicion of the truth of the prin-" ciples I have advanced; and that, I believe, " they have nothing to fear from enemies,

" but

" but the falſe relation of facts, or falſacious " arguments."

About two years before Mr. Tull wrote this, he was deſired to take an exact account of the product of a ſingle acre of hand-hoed wheat, and of an acre in the middle of a field of twenty-five acres of horſe-hoed wheat, in order to know the different quantities produce by them.

" The firſt was in a common field, and " planted upon the level, with the ſame drill " that planted the other, whereby there was a " ſpace of ten inches between two rows, and " a ſpace of eighteen inches between thoſe " and the next row: ſo that each row had " fourteen inches of ſurface for the roots " to ſpread in. It was hand-hoed very well. " The land hath not been dunged in any " manner ſince the year 1719. This crop " was reaped very low, and threſhed out im- " mediately. It produced eleven buſhels and " a half: the meaſure of the land being fifty- " two perches, the product is at the rate of " thirty-ſix buſhels and ſix gallons to an acre. " It is ſituate next the ditch of a meadow, " and is all the land I have in the common " field. The lands adjoining to it, of the " ſame goodneſs, were judged by all gentle- " men and farmers who viewed them not to " have above half the wheat on them, that " this had, perch for perch; and yet there " was no difference in the management, except

" this

" this being regularly planted, and hand-
" hoed, without dung, and the other ſowed
" at random, and dunged (as they always are
" once in three years): the fallowing and
" ploughings of both were the ſame. Mine
" was ſaid by ſeveral of the farmers of the
" place to be the beſt land of wheat in the
" pariſh.

" This indeed ought to be allowed, that
" mine being moſtly *white cone* wheat, and
" the adjoining lands of clean *lammas*, might
" make ſome part of the difference; but there
" being ſome of the ſame ſort of lammas
" amongſt this cone, it was obſerved to be as
" high as the cone, and the ears of it to be
" of double the bigneſs of thoſe in the conti-
" guous ſown lands.

" As to the acre of horſe-hoed wheat, it
" was meaſured eight perches broad, and
" twenty long, which is equal to ſixty-ſix
" feet in breadth, and ſix hundred and ſixty
" in length, this being the ſtatute meaſure of
" an acre, and we uſe no other for land in
" this country.

" This acre being laid by itſelf, was, after
" ſome time threſhed, and yielded twenty-
" nine buſhels and ſix gallons of clean
" wheat.

" Before it was threſhed, it was ſomewhat
" diminiſhed by cows that found a hole betxixt
" the boards of the barn, and pulled out ſome
" of it; and poultry eat more of it; but the
" moſt

" moſt extraordinary waſte was made by bad " reapers, to whoſe lot this acre fell. They " cut it ſo high that many of the ears, which " by their great weight bended down very " low, were cut off and fell on the ground, " and were there left much thicker than is " uſual. This waſte was greater than any I " had ever ſeen: ſo that, I believe, if it had been " as well reaped as moſt of the reſt of my " wheat was, there would have been thirty-" two buſhels received from this acre.

" The difference of the appearance of the " hand-hoed and of the horſe-hoed, whilſt " they were ſtanding, was ſo great as to de-" ceive many who ſaw them, and to induce " many to imagine, that the product of the " former, would be double to that of the " latter; though it was really little more than " an eighth part greater.

" The horſe-hoed ſhews the whole interval " empty until the grain is almoſt full, which " is a great advantage to the crop: becauſe, " unleſs the air did freely enter therein, to " ſtrengthen the lower parts of the ſtalk, " they would not be able to ſupport ſuch pro-" digious ears (ſome containing an hundred " and twelve large grains a-piece) from fall-" ing on the ground.

" When the grains are full, the ears turn " their upper ends downwards, and are all " ſeen in the intervals, and nothing but ſtraw " on the rows: this reverſe poſture of the

ears

" ears defends them from the injuries of wet " weather, when ripe: for the rain is carried " off by their beard and chaff, which like tiles " protect the grain from being discoloured, " as sown wheat always is by much rain, " when ripe.

" This difference was fully shewn last har- " vest, when all my wheat was in the same " posture: none of the ears reached the " ground, but some reached within a foot, " others within half a yard of it, and some " not so low. None of the straws were " broken by the weight of these large ears; " they only bended round at the height of " about a yard, or higher, in a manner that I " never saw in any other wheat but the " horse-hoed. In these intervals, notwith- " standing this bending posture of the ears, " one may walk backwards and forwards, " without doing any damage: for the ears, " when thrust out of their places, will, by " their spring, return to them again, like " twigs in a coppice.

" If a field of such wheat, for want of a " good change of seed, or by any other cause, " should be smutty, the smutty ears will stand " upright over the rows, and may, at the " expence of about a shilling an acre, be cut " off with sciffars by women and children, " which is the only perfect cure for that ma- " lady, when it happens; and the damage is " nothing but this small expence, and the loss

" of

" of the ears cut off; which, though they
" ſhould be but the fortieth part of the crop
" (as they are ſeldom more), would ſpoil it:
" but, being thus taken out, leave the remain-
" der generally large-bodied, and as fine as
" that which hath no ſmut amongſt it; ex-
" cept that it is not fit for ſeed.—There is
" not this convenience either in ſown or
" hand-hoed wheat.

" As to the different profit of the hand-
" hoed and the horſe-hoed crops, it will, upon
" examination, appear to be contrary to the
" opinion of the vulgar. The ſoil of the
" hand-hoed being, at leaſt, as good as of the
" other; let us ſuppoſe them equal, and alſo
" the expence to be equal, though, in gene-
" ral, that of the horſe-hoed is the leaſt.

" The hand-hoed was planted on a fallow,
" but the other had a good crop of wheat the
" preceding year, drilled in double rows, and
" the year before that had a crop of barley,
" drilled in treble rows; the ridges always of
" the ſame breadth. All theſe crops were
" horſe-hoed: but in the year before the firſt
" of theſe, the field had a crop of ſown black
" oats: ſo that there were four ſucceſſive
" crops, without any fallow or dung; and
" there is now growing a fifth crop, being
" wheat, likely to be much greater than any
" of the precedent, if the year prove as fa-
" vourable: therefore, here being two crops
" of wheat for one, the profit of the horſe-

" hoed is almoſt double to that of the hand-
" hoed.—And as the hand-hoed has but one
" wheat crop in three years, and one barley
" crop, which is commonly ſcarce half the va-
" lue of a wheat crop; and the expence in
" three years being in ſeed, tillage, &c. as
" much as of the three wheat crops, the pro-
" fit of the horſe-hoed will be more than
" double that of the hand-hoed.

" And this, I think, is a ſtrong proof of
" the efficacy of deep hoeing, which, with-
" out a fallow, can (as in this caſe) cauſe
" one double row to produce as much wheat,
" as two double rows of the ſhallow-hoed
" did, with a fallow, in an equal quantity of
" ground: which could not be, unleſs each
" row of the leſſer number did produce more
" or greater ears, or both, than each row of
" the larger number. Neither could this be,
" if the roots did not take the greater part of
" their nouriſhment from the pulverized in-
" tervals; conſidering that the rows that had
" no fallows muſt, without the deep pulve-
" rization, have produced much fewer and
" leſſer ears than an equal number of rows
" that had the benefit of a fallow.

" Vain therefore is the opinion of thoſe,
" who ſay the roots of wheat do not reach
" further than two or three inches from the
" ſtalks: for if they did not, theſe horſe-hoed
" rows could have very little or no nouriſh-
" ment from the pulveriſation of the inter-
" vals

" vals not entering into them; and then muſt
" have produced leſs than an equal number of
" rows of the hand-hoed (that had a fallow)
" did, inſtead of almoſt twice as much."

In the year following, he writes, p. 274, " My ſingle land of fifty-two perches in the " common field, mentioned in my *Addenda*, " brought the laſt harveſt a crop of barley " (in the opinion of all who viewed it) dou- " ble to the land, of the ſame goodneſs, con- " tiguous to it, at the end and ſide of it. " This ſhews, that the benefit of pulveriſa- " tion of *one* good hand-hoeing, performed " half a year after planting the wheat, toge- " ther with the leſs exhauſtion of half the " ſeed, and no weeds, vaſtly exceeded the " uſe of dunging for the wheat on the con- " tiguous land, there being no other differ- " ence."

[This example of horſe-hoed wheat ſhews, not only the great advantage of that culture beyond the common courſe of Huſbandry, with fallowing; but likewiſe its ſuperiority to the Modern Improved Huſbandry of fallow crops, as turnips, cabbages, &c. inſtead of a fallow: for while the land is yielding a fallow crop, it would, by horſe-hoeing, produce a crop of wheat, which is of more value than any of the common fallow crops, including the expence of the dung or manure beſtowed upon them.]

Mr. Tull proceeds to give ſome account of the reſt of his horſe-hoed wheat, whereof the products are not ſtated by meaſure, as of the acre above-mentioned; but, as he computed them, his hoed wheat that year, amounting to an hundred and ſix acres, yielded nearly two thouſand one hundred and ſixteen buſhels, or about twenty buſhels per acre: which conſidering the quality of the land, and circumſtances of it when drilled, may be reckoned a good crop: for he relates, that being advanced in years, and in an ill ſtate of health, he intended to have let his farm, and had agreed with a tenant, and therefore omitted to prepare a conſiderable part of his land for drilling with wheat: and the tenant diſappointing him, he was obliged to plant it with ſummer-corn, which put him out of his courſe of Huſbandry, and was an injury to the land.

"It is true," ſays he, "I was at great "loſs by giving attention to that tenant; but "I was deſirous of being out of all buſineſs, "my infirmities increaſing upon me." And this to ſuch a degree, that, as he takes notice elſewhere, he was frequently confined within-doors, and ſometimes to his bed.—And another circumſtance was, that his Huſbandry was managed altogether by day-ſervants. Theſe circumſtances, together with the inferior quality of his land, being conſidered, are much in favour of the New Hubandry, which, under ſuch unfavourable circumſtances, could

could ſucceed, ſo as every year to produce profitable crops; and no other means uſed to obtain them but hoeing, and once ploughing the land.

The eſtabliſhed reputation of this gentleman, for candour and veracity, leaves no room to doubt the truth of theſe experiments, which were alſo often inſpected by many noblemen and gentlemen. Theſe might have been ſufficient to ſatisfy the author of the Farmer's Kalendar, that the principles of the New Huſbandry are not falſe, as he aſſerts; and that the general practice of it would not be miſchievous, as he fancies; but very much the reverſe. It is not, however, neceſſary to refer wholly to theſe experiments, for many have been ſince made abroad with the ſame ſucceſs, and publiſhed by M. Duhamel and his correſpondents. Alſo that eminent cultivator, Sir Digby Legard, practiſed this Huſbandry upon the very poor wolds near Scarborough, where he raiſed barley and wheat upon ſeven acres of land, in the method of drilling and horſe-hoeing for eight years ſucceſſively, raiſing crops of barley and wheat every year, without manure, upon ſo light a ſoil, that one horſe was ſufficient for the hoeing. Sir Digby, in a letter to the London Society of Arts, relates the particulars of this culture, which he recommends, as ſuperior to the Common Huſbandry; and particularly takes notice that his land was improved by it, and

produced much better crops the laſt four years than it did at firſt: though in all that time it was neither reſted nor manured.

Another gentleman in *Berkſhire*, the Rev. Mr. *Deane*, in a letter he wrote ſome years ſince, ſays, "I had the pleaſure of being acquainted with Mr. *Tull*, and made him two viſits at *Proſperous*, and took an experienced farmer with me; where I ſaw ſome excellent crops, and ſome very poor ones, on his own, and on other people's land; and was convinced the poor crops were not owing to his Huſbandry, but to the native poverty of the country; being a light, poor, ſhallow, chalky ſoil, ſituated near the top of the *Hampſhire-hills*, and very little land there is proper for wheat; and he adviſes practitioners, not to attempt to cultivate wheat upon ſuch poor land.

"In my opinion Mr. Tull's principles are founded in truth, and on the certain laws of nature. Being convinced of the reaſonableneſs and truth of his principles, I have practiſed his horſe-hoeing Huſbandry above twenty years, on the ſame land, with ſucceſſive crops of wheat, with but few intermiſſions, and can ſee no reaſon to queſtion the truth of his principles.

"My ſoil is not the beſt wheat-land, nor rightly adapted to the *Tullian* Huſbandry, becauſe we ſuffer greatly by the extremes both of wet and dry ſeaſons; ſometimes our

" land being bound up as hard as iron, not to
" be touched with a plough; and ſometimes
" all in a pap, not to be trod upon. Fre-
" quent avocations of my men and horſes to
" other buſineſs, indocility of ſervants, and
" averſeneſs of ruſtics to be put out of their
" old tract, have ſometimes occaſioned neg-
" lects in catching critical ſeaſons for horſe-
" hoeing; and conſequently my land became
" foul and out of tillage, which was the reaſon
" of my intermitting my annual crops, in
" order to clean the land and reſtore the til-
" lage, which happened about three times
" ſince I began; and in the intermiſſion I
" once gave the field a ſummer fallow,
" ploughing acroſs the lands, to lay them out
" in a new manner; at other times, I planted
" part with peaſe, and part with vetches.

" Part of a field near my houſe has taſted
" no dung, or other manure, ſince I began, for
" experiment's ſake; the other part was fre-
" quently dunged, and the whole field other-
" wiſe cultivated alike; but the difference of
" the crops at harveſt was ſcarce diſcernible.
" My ſervants, who knew the place, thought
" they could perceive the odds; but it would
" be very difficult for a ſtranger to find it
" out.

" In general my *Tullian* crops (which are
" large and upon various fields) have been
" nearly equal to the ſown crops of my neigh-
" bours in the different years. I plant about

" three pecks of wheat on a ſtatute acre, and " receive from two to four quarters return. " The farmers in the old way uſually plant " about ten or twelve pecks on an acre, and " receive in return no more than I do, *com-* " *munibus annis.*"

Another and very ingenious practiſer of this huſbandry, William Craik, Eſq. near Dumfries in Scotland, has practiſed the new huſbandry many years, and thus deſcribes his land: " My ſoil is ſtiff and very moiſt; that " is, in the bottom below the ſtaple, is a hard " and almoſt impenetrable till, impervious to " water, which of conſequence keeps the top " poachy, and therefore am obliged to drain " every field with covered drains filled with " ſtone. Add to this, that our climate is ex- " tremely watery, ſo that both ſoil and climate " are againſt me, eſpecially in the New Huſ- " bandry.

" About ſeven years ago, I began to drill " wheat in double rows, on ridges five feet " two inches broad; but have now reduced " them to four feet ten inches on the laſt- " taken-in fields; which ſize I find anſwers " every purpoſe beſt for double rows of " wheat; and ſingle rows for turnips and po- " tatoes. I continue the double rows of " wheat; and drill a little ſhort of a Win- " cheſter buſhel to the Scots ſtatute acre " [one and a quarter Engliſh]. My return " upon the average is about twenty-five

" of

" of ſaid buſhels, ſince I firſt began; and the " total expence, harveſt-home, is about a " guinea, ſeed included. But the return " would conſiderably exceed this, were it not " for ſome parts in every field, that have " every year quite failed: in ſome occaſioned " by a vein of ſandy, gravelly ſoil, that runs " acroſs two of my fields; and in all others, " from the old ridges being very high raiſed " by the former farmers, and at the ſame " time very broad and crooked, which obliged " me to level the whole; the conſequence of " which is, that the tops of the old ridges " continue barren for ſeveral years, to my " great loſs. I was for ſome time in hopes, " that frequent cultivation and expoſure to " the air would in time remedy this defect: " but, finding little alteration in theſe parts, " I am now applying proper dreſſings, ſuited " to the different ſoils, which I have already " found will anſwer the purpoſe, and make a " very ſenſible difference in my profits.

" When the crop is off, the ridges are " ploughed up, and formed anew, then " ſmoothed by the drill-harrows, and drilled " with the drill-plough. When the wheat " has got three or four leaves, I horſe-hoe " from the rows, agreeable to Mr. *Tull*. In " the ſpring, I always deepen the ſame fur- " rows, made before winter; after which it " lies till the wheat begins to ſpindle, when " I horſe-hoe back the earth, ſo as to earth up

" the

" the plants two or three inches, to ſtrengthen " or ſecure them. In this operation a ſlip of " earth remains untouched in the middle, of " what was ploughed firſt from the rows; " and as a new ſurface is expoſed by the laſt " hoeing, I leave that ſlip untouched for " ſome time, to receive the advantage of ex- " poſure, and till the weeds come, when I " plough up this ſlip with the double-mould- " board-plough, which covers the weeds, and " leaves a wide, deep, and clean trench. If " the wheat ſtands fair, ſo as to admit the " horſe-hoe, which with me is ſeldom the " caſe, I hoe a ſmall furrow back from the " rows, and return it with the double-mould- " board-plough: but do not think this neceſ- " ſary, if the former operations are properly " executed.

" Though my ſoil is ſtiff and heavy, I only " uſe two horſes to the ſingle hoe, and three " to the double-mould board hoe. The ſingle " hoe horſe hoes two and a half Scots acres " *per* day, and the double-mould board five; " the firſt having a full bout to each ridge, " the other only half a bout. I have tried to " hoe with oxen, but found they did not " anſwer in my wet ſoil; and now only uſe " horſes, as they poach the land leſs.

" I have now [in 1766] the ſeventh crop " of drilled wheat growing on my firſt acre " (which I choſe as near the average of my " ſoil as I could), and it at preſent promiſes to " be

" be the beſt. This acre conſiſts of twenty-
" two ridges, nine of which were, three years
" ago, ſtrongly dreſſed with dung; that ſide
" being lighter than the other, and generally
" failed: ſince dreſſing, that part has proved
" better, but ſtill inferior to the undunged
" ſide. This acre, as well as all my fields,
" was dreſſed at firſt with ſhells, and bore four
" broad-caſt crops, immediately preceding the
" drilled crops.

" I have only, this year, thirty Scots acres
" in drilled wheat; the wet ſeed time laſt
" year, having prevented my drilling a ten
" acre field, now in turnips and potatoes: for
" I dare not touch my ſoil with the plough,
" when wet.

" The field with the ſixth crop of drilled
" wheat, and which had five broad caſt crops
" previous to theſe, hath at preſent as full a
" crop as can ſtand upon it; except where
" the ſandy vein comes in. The field with
" the fifth crop is inferior to it, though equally
" good ſoil. In general, where the ſoil was
" originally tolerable, and excluſive of the
" particular acidents I have mentioned, I can-
" not perceive hitherto any decline in the
" crops, even theſe that have not received any
" dreſſing with dung; but how long this will
" go on, time only can determine.

" I always horſe-hoe from the rows, whe-
" ther double or ſingle, at one bout, half a
" bout to each ſide; and could return this
" bout,

" bout, with the double mould board, at half " a bout, which was for ſome time my " practice: but now find it more profitable, " firſt to return the bout by another bout " of the ſingle hoe, which expoſes a large " new ſurface; and then, when the weeds " are up, clean up with the double mould " board. But at the ſecond hoeing from the " rows, which is after the grain is got into " ear, I only take two ſmall furrows, viz. one " from each ſide; theſe I return at once, with " the double mould board.

" I have uſed the white lammas wheat, the " *Kentiſh* red; the *Zealand*, from *Holland*; the " white and grey cone; and this year, a ſmall " quantity of *Smyrna* wheat, *Spica multiplici*. " Yet I find none of them can reſiſt the vio- " lent ſtorms of wind and rain of our climate. " Both the cones ſtand the beſt; but our " millers have not art enough to grind them; " on which account our bakers are ſhy to " buy. I have moſtly ſown for the horſe- " hoe, the grey cone. A part of my laſt " year's crop went to the *Iſle of Man*, to *Ram-* " *ſay*, and was ſo large a grain, that our " bakers objected to it on that account.

" My crop this year conſiſts of the grey " cone, the red Kentiſh, and the white lam- " mas, ſome of each in the ſame field, on " purpoſe to ſee which ſtood beſt; and now " find, the red Kentiſh has ſuffered moſt; " and that the white lammas, of a kind I had

" from

" from *London*, ſtands equally well with the " grey cone; which has determined me to " ſow it moſtly for the enſuing crop.

" My drilled wheat is generally, by the time " it gets into bloſſom, ſo laid over, though not " broke, that I can neither horſe-hoe, hand-" hoe, or hand-weed. So that a ſecond crop " of weeds never fails to ſpring up time enough " to ripen their ſeed, before the crop is cut: " and this, with me, is the great and invinci-" ble objection to a ſucceſſion of wheat crops " in this way; at leaſt in my ſoil, and this " climate. What I propoſe, to remedy this, " is, to take a crop of horſe-hoed turnips, " next a horſe-hoed crop of beans; next " two or three crops of horſe-hoed wheat; " and then return to the turnips. In this " way, I am ſure to extirpate the weeds, " during the turnip and bean crops, and have " reaſon to expect my wheat ſhall be a full " crop, after theſe meliorating ones.

" If the drilled wheat ſtood fair, it would " be cut down at one half the expence of " broad-caſt, at leaſt: for, even when laid " over, and very much diſordered, I do it for " two-thirds of the expence of the other.

" Were it not for the parts that fail in my " fields, my horſe-hoed crops would exceed " four quarters. Laſt year, on half an acre " *Scots*, I had twenty-two *Winchefters* [thirty-" five buſhels per *Engliſh* acre], but this was " all equally good."

By

By this gentleman's ſtate of his ſucceſſive wheat crops, it is evident, that his land was not impoveriſhed by them, but improving; as appears by his laſt crops, though it had no manure.—And though his tolerable good land was ſo much enriched by the horſe-hoeing and expoſure, that it produced as good crops every year, as are commonly obtained in the Old Huſbandry, with the aſſiſtance of manure; yet it is remarkable, that the influences of the atmoſphere did not penetrate deep enough into the old ridges to enrich them; but, by opening the land by horſe-hoeing, and at the ſame time frequently changing and expoſing the ſurface, that was ſufficiently impregnated with the vegetable aliment, to produce every year a good crop of wheat.

Theſe drilled crops were remarkably profitable. The whole expence of the culture and ſeed, harveſt-home, at one guinea, is about ſeventeen ſhillings per Engliſh acre; and therefore, when wheat is only five ſhillings per buſhel, leſs than four buſhels of wheat pays the whole expence of the ſeed and tillage of an acre: and if the tillage and rent together ſhould amount to forty ſhillings an acre, eight buſhels pays all the expence of a horſe-hoed crop of wheat; and all the crop above eight buſhels per acre is clear profit.—The profit of the Old Huſbandry does not come near this, though the crops ſhould be as great or greater: the fallows, or fallow crops, not equal in value to wheat, ſo much reduce the farmer's profit,

profit, that he cannot equal the Drill-Husbandry with his corn crops, nor unless he substitutes the potatoe, cabbage, and carrot Husbandry, instead of barley, oats, and peafe.

The reader may perceive how different these examples of extensive practice are, from the trifling, inconclusive experiments upon a few perches of ground, referred to by the authors above-mentioned; wherein neither the nature of the land is mentioned, nor the manner of performing the culture is shewn; and yet we are referred to these inaccurate and plainly-unskilful attempts to imitate this Husbandry, as conclusive, in determining the merits of two different methods of Husbandry; than which nothing can be more trifling and inconclusive; especially as it is evident, that these experiments were made by persons who were ignorant of the New Husbandry, or performed without skill or accuracy, and even contrary to the real practice of this Husbandry: the reader therefore of these pretended experiments need not be surprized to find the event of them so entirely different and contradictory to the genuine practice of the skilful cultivators here quoted: who have fully proved upon their lands at large, and for a continued course of many years, that the New is much more profitable than the Common Husbandry; whereof one of the gentlemen, Mr. Craik, can fully justify what has been here laid of his success upon land not the best

adapted

adapted to this Husbandry, and in a climate very unfavourable to constant and successive crops of wheat upon the same land.—This excellent cultivator succeeds also in horse-hoeing beans; turnips also in single rows, upon his ridges near five feet broad, in order to clean his land perfectly from weeds.—Potatoes likewise in single rows upon the ridges, which, by horse-hoeing, produces him greater crops, than is obtained there in the Common Husbandry. He cultivates also some other crops in the horse-hoeing method with success; and even Lucerne for years past, which produces four cuttings in every summer, upon his cold moist land. All his crops thrive with him, and have done so for many years; though both soil and climate are against him; an evident demonstration of the excellency of the New Husbandry; as its failing in the above trifling experiments is of their unskilful management.

Since writing the above, I have perused a late Treatise of Husbandry, entitled *The Complete English Farmer*, said in the title-page to be written by a Friend of the late Mr. Jethro Tull, Author of the Horse-hoeing Husbandry.

The author of this is said to be a gentleman-farmer, who resided formerly near Hungerford in Berkshire, and since that in Kent. He appears to be well acquainted with the Common Husbandry; and it might beexpected, from the title of his book, that he was also well informed

informed of the New, being a near neighbour and friend of Mr. Tull. But it ſeems, by his deſcription of the New Huſbandry, that he knows only the firſt priactice, which Mr. Tull exploded, and ſays nothing of the alterations and important improvements made by Mr. Tull, and which he has recommended in the additional parts of his work, the Supplement, Addenda, and Concluſion. As theſe were publiſhed long ſince, and the Complete Engliſh Farmer's book not till the year 1771, his readers, who, from the title, may expect a ſatisfactory account of the New Huſbandry, will be much diſappointed; and whoever ſhall be perſuaded, by reading this treatiſe, to attempt it, will be miſled. But it is preſumed very few, if any, will, from his account, which tends to diſcourage beginners; and he raiſes ſeveral objections to that Huſbandry; whereof ſome of the principal are the following. In his Preface, p. 15. "In "the horſe-hoeing culture," ſays he, "though "the expence of labour may be leſs, the "waſte of land is out of all proportion "greater [than in the Common Huſbandry]; for there only *four* inches out of "*ſeventy-two* are planted, the remaining "ſixty-eight are left for the introduction of "the hoe-plough. And will any one ſay, "that in the nature of things four inches can "be made to produce as much grain as *ſeventy-two*, provided the whole ſeventy-two

" are all in the ſame heart before planting? " From my own experience, I am inclined to " conclude they will not."

This objection refers to Mr. Tull's method of drilling wheat upon ſix-feet ridges (or ſeventy-two inches), and two rows upon each ridge; which two rows, the author ſuppoſes, occupied four inches; and then he aſks, will any one ſay, that in the nature of things four inches can be made to produce as much grain as ſeventy-two; ſeventy-two he means, or the land all ſown as thick as it is uſually done. The anſwer is, yes; the four inches can be made to produce as much as the ſeventy-two commonly does; and for this we have this author's own authority: for he acquaints his readers, p. 213, when ſpeaking of the alternate Huſbandry, " that Mr. Tull had *often* " upon two rows in ſix-feet lands, at the rate " of five quarters of wheat on an acre." This is a great crop, much greater than is commonly obtained by farmers, who cover all the ground with plants. But covering all the ground is no ſure way to obtain a full crop: for plants do not produce moſt ſeed when they ſtand thick upon the ground, but in proportion to the room and nouriſhment their roots have in it, which the author ſeems not to have conſidered; nor to have known, that Mr. Tull had left off drilling wheat upon ſix-feet ridges. He alſo reckons the horſe-hoeings of wheat as ſo many whole ploughings, though

though a hoeing is only two furrows, and a whole ploughing four or ſix furrows; and though only half the number of the ſame horſes is neceſſary for hoeing as for ploughing the ſame land.

This author recommends the Common Huſbandry; but, in eſtimating the profits of it, he ſays, that a farmer who takes five hundred acres of land, whereof two hundred acres are to be always corn, ſhould be poſſeſſed of a ſum to begin with of fifteen hundred pounds; and p. 62, "that the beginner muſt "not flatter himſelf, that leſs than fifteen "hundred pounds will be ſufficient." Yet he tells him, p. 204, "that fifty pounds a "year laid by in clear profit is nearly as "much as a farmer can annually accompliſh, "who rents two hundred pounds a year." If this is all the profit he is to expect, there is little encouragement for a farmer to lay out his money in the Common Huſbandry: for this is eight pence an acre clear profit, for all his labour and hazard; and from his arable land, meadows, and paſtures; alſo from his ſheep, cattle, dairy, hogs, &c. It is but three and one-third per cent. for his money; which he might employ to much greater advantage in other buſineſs, and at common intereſt at four or five per cent. Very different from this is the New Huſbandry, which does not require near ſo large a capital, and, as we have ſeen above, that land of moderate ferti-

lity produces profitable crops of wheat, Mr. Tull's twenty buſhels per acre; Mr. Craik's twenty-five buſhels per acre, at the expence of only a guinea, for expences of ſeed, culture, and carriage home; and the author of Rural Improvements has juſtly obſerved, that there is a profit from only eight buſhels of wheat per acre: ſo that an hundred acres of wheat in the hoeing Huſbandry is really more profitable than a farm of five hundred acres in the Common Huſbandry.

It will be unneceſſary to take notice of all the objections made to the New Huſbandry, by the author of the Complete Engliſh Farmer; and may be ſufficient to acquaint the reader, that Mr. Tull began his hoeing culture for wheat upon level ground at firſt, drilling two, three, or four rows, at ſeven or eight inches diſtance; and, leaving a ſpace of about four feet, drilled two, three, or four rows more as at firſt; the narrow diſtances between the rows, called *Partitions*, was hand-hoed, and the wide or four-feet ſpaces, called *Intervals*, was horſe-hoed; viz. was tilled with a plough, while the crop was growing. But finding upon trial, that drilling upon ſix-feet ridges, two, three, or four rows upon each, the ridges were eaſier horſe-hoed, and produced better crops, he left off drilling wheat upon level ground, and drilled only two or three rows upon each ridge. The method of drilling thee rows he continued for ſome

years,

years, and then horſe-hoed his intervals uſually ſix times, and the partitions were once or twice hand-hoed, according to the weeds, and ſtate of the land. But in this way, the middle row was greatly inferior to the outſide rows; and then he endeavoured to make it equal to them, by deepening the ſoil in the middle of the ridge; to do this, the ridges were raiſed higher in the middle; but the two outſide rows being deprived of ſo much mould thrown to the middle of the ridge, though the produce of the middle row was encreaſed, the outſide rows were diminiſhed in a greater proportion. This obſervation induced him to leave off entirely the middle rows, and to drill only a double row ten inches diſtant, upon ridges of about four feet and eight inches broad; by this method, the intervals to be hand-hoed were nearly of the ſame breadth as before, were only four times hoed, and in a different manner, and the rows in the partitions, being wider, could be deeper hand-hoed. This was his laſt and beſt method of cultivating wheat, and as ſuch he recommends it. I have here taken notice of this particularly; becauſe none have excelled him in the culture of wheat, but ſeveral have fallen ſhort of him. The gentlemen abroad did ſo, becauſe they followed Mr. Tull's firſt method; his improvements not being then publiſhed, and tranſlated into French, as his Eſſay was; and ſeveral modern authors in England appear to be unacquainted with the

latter parts of this Huſbandry; among theſe the author of the Complete Engliſh Farmer, by which he has done it a real injury; as it may be expected, that one who calls himſelf a friend to Mr. Tull would have given an account of his Huſbandry to be depended upon; and therefore it is hoped that, if his book comes to a ſecond edition, he will do juſtice to his friend, and acquaint the public of his lateſt and improved practice.

When the tranſactions of the patriotic Society of Arts were publiſhed, by Robert Doſſie, Eſq; he takes notice in his firſt Volume, p. 72, "That when the Society endeavoured "to procure information and trials requiſite "to the deciding the important queſtion, re- "ſpecting the comparative utility and advan- "tages of the *Drill* and *Broad-caſt* Huſban- "dry: the public had," p. 78, "very little "ground, when the Society took that mat- "ter up, of known experiments and calcu- "lations, on which to form a judgement, "how far it was worthy the notice of thoſe, "who are ready to adopt feaſible improve- "ments in Huſbandry." So imperfectly were the merits of the Hoeing Huſbandry then generally known; and Mr. Doſſie ſpeaks doubtfully of them.

But, after the Society had received the accounts ſent them of this Huſbandry, by Sir Digby Legard and Mr. Lowther, Mr. Doſſie obſerves, p. 386. "Theſe facts furniſh very "con-

" concluſive reaſons for believing, that what " can be cultivated conſtantly, without ma- " nure, even on land not very well ſuited to " it, with greater profit than the common " crops in the broad-caſt, with the aid of fal- " low and manure. But this profit would " neceſſarily be found to be much greater " on land that is properly ſuited to that grain. " —If we take the ſame view of the actual " produce in the experiments of the barley " cultivated in the drill-way, for which this " land was proper, the facts ſhew the real " profits equal to thoſe we have deduced here " with reſpect to wheat by concluſions."

Some of the other experiments recited in this treatiſe, of long ſucceſſive crops of wheat, on various ſorts of land, ſuperior to any related by Mr. Doſſie, abundantly confirm the merits of this Huſbandry in the culture of wheat. To which, if the improvement of many other crops be added, no doubt can remain of the ſuperiority of the New Huſbandry.

Theſe examples of horſe-hoed crops may be ſufficient to ſhew, that land is fertilized by the atmoſphere, contrary to what the author of the Farmer's Kalendar ſays, " that of all " the volumes that have been publiſhed on " Huſbandry, none gives one a clear proof of " the acquiſition of manure from the atmo- " ſphere." This may be admitted in general, of the authors who have wrote upon the Old

Huſbandry; as the acquiſitions from the atmoſphere were unknown to them, or very imperfectly underſtood, till Mr. Tull explained, and proved it; and therefore this author was not likely to find it proved in their works; but, as he quotes Mr. Tull, he cannot be excuſed in advancing this, ſo oppoſite to the principles of the New Huſbandry, fully explained and proved by him, as well as by ſeveral foreign authors, whoſe works have been publiſhed many years ago. But, ſays he, "the benefit of fallowing is no *clear* proof, "becauſe it is never experienced excluſively, of "killing weeds; and unleſs ſuch effects were "known *diſtinctly*, one cannot with any *preciſion* attribute a certain degree to each."

And becauſe we cannot know theſe effects *diſtinctly* and with *preciſion*, the author would perſuade us, that therefore the atmoſphere has no effect at all, in enriching land; but that the benefit of fallowing, is wholly owing to killing the weeds—But, in a courſe of tillage, the injury done by weeds is, at an average, nearly the ſame one year as another; and if, as farmers in general allow, fallowing is beneficial to land, that muſt ariſe in part from the atmoſphere, and is certainly ſo in the New Huſbandry, for there no weeds are ſuffered to grow, or nearly the ſame one year as another; and yet is the fertility ſo much encreaſed by hoeing and expoſure, as to nouriſh a crop of wheat every year, equally as with manure—

"But

" But as, ſays he, experiment has not, and " probably will not prove this important point, " it remains for the diſquiſition of reaſon " alone." This author appears to be a practical huſbandman, and makes many good obſervations upon huſbandry; but his partiality to the common ſyſtems, and over-rating the value of manure, has led him into an indefenſible partiality to it. Dung with him is every thing. On the culture of madder, he ſays, p. 341, " the article of manure is the ſoul of " this culture; the plant delights to grow in " a dunghill, ſo that you need not fear over- " doing it; perhaps one hundred loads an acre, " of black rotten dung, may be found the " proper quantity for the firſt crop of madder. " And for the ſecond crop, the earth being " dug three feet deep, it will be abſolutely " neceſſary to mix in with it from fifty to " one hundred loads of rotten farm-yard dung, " a year and half old, that has been twice or " thrice turned over; this will enrich and " mellow it in a ſurpriſing manner;" and ſo indeed it ought, for this is a ſurpriſing quantity. He directs almoſt as much for liquorice, and great quantities for ſome other crops. But this author ſhould have known, that much dung is an injury to madder, debaſing the colour of the dye. And that the liquorice raiſed near London is much inferior to that in other parts of England, only becauſe the liquorice grounds about London are dunged too much.

With

With regard to what this author advances, that experiment has not, and probably will not prove, the acquiſition of fertility, or (as he calls it) manure from the atmoſphere; the above experiments have not only proved it, but he might have eaſily ſatisfied himſelf of the truth of it, by a ſmall experiment of ſome plants, of wheat, &c. upon a few perches of ground; and by well cultivating them, and keeping the ground perfectly clean from weeds, he might have diſcovered, whether the benefit of a fallow ariſes merely, as he ſuppoſes, from killing of weeds.

But, to anſwer this objection fully, I ſhall recite an experiment made by the very ingenious M. de Chateauvieux. "Repeated ex-"perience, ſays he, the effects of which have "conſtantly been the ſame, have taught me, "and I can ſafely affirm, that extremely bad "lands, which could not ſo much as yield a "crop that would pay the expence of tilling "them, have been rendered good and fertile, "merely by ploughing, and without the aſ-"ſiſtance of any manure. This is a ſtriking "truth; it was that firſt determined me to "practiſe the New Huſbandry; and therefore "it was of conſequence to me to be certain of "it. To this end, I was reſolved to make a "trial on a ſmall ſpot of ground, which I knew "to be incapable to produce any thing. Some "years before I had dug away the earth three "feet deep, from a ſpace of 60 ſquare toiſes

"[about

" [about eight Engliſh perches]; nothing re-
" mained in it but a cloſe white clay, fit for
" potters uſe. This ſpot, thus circumſtanced,
" ſeemed to me a proper one for my experi-
" ment. As the ſpace was too ſmall for the
" plough to work in, I made uſe of the ſpade
" and hoe: it was made into beds, which
" were afterwards ſowed with wheat, and the
" ſpaces between them frequently ſtirred.
" The firſt year my plants were very poor, and
" branched only into two, three, or four ſtalks
" apiece; the ſecond year they did much
" better; and the third year they were as large
" and as fine as any my garden could have pro-
" duced. This ſpot continues to produce
" equally well.

" We have here a remarkable inſtance of
" what may be done, by ſufficiently pulve-
" riſing the earth: that which I am ſpeaking
" of, is now like mould; and, which is very
" remarkable, it has loſt its former white
" colour, and is now black: let us but allow
" the ſame with any of our bad lands, and per-
" ſevere in ploughing and ſtirring them a ſuf-
" ficient time, and the ſucceſs will not
" be doubtful." This one ſmall experiment is a ſufficient anſwer to the objection of the above author.

But ſo ready is he to recommend dung on every occaſion, that, ſpeaking of manuring graſs-lands, he ſays, p. 284. " It is difficult
" to over-manure arable lands, but very eaſily
" done

" done with graſs." A maxim this, the reverſe of the practice of the beſt farmers, eſpecially of arable lands cropped with corn. The following letter from an Eſſex farmer will ſhew this very clearly.

" It is now upwards of ſeven years, that I " have been tenant of a conſiderable farm in " Eſſex; but as there are ſome particular cir- " cumſtances attending this farm, I muſt beg " leave to ſay a few words on the ſubject.

" The ſoil, which is for the moſt part a " mellow loam, or what is in general called " a good wheat ſoil, was in very good heart, " and not impoveriſhed; yet the laſt tenant " broke on this farm, and the landlord loſt " by him near two years rent: for his crops " of wheat were continually damaged by " ſmut, let him take what care he would of " the ſeed, and were beſides often laid; and " the land got very foul, though he was not " ſparing of his fallows.

" On the contrary, ſince I have occupied " this land, it has borne large crops of good " ſound wheat, with very little ſmutty corn; " and barley, oats, peaſe, beans, and other " things in proportion. What will appear " ſtill more ſurprizing is, that I do not lay on " half ſo much dung as he did.

" It will now perhaps be neceſſary to ex- " plain this ſeeming paradox. At no great " diſtance from the farm lives the land- " lord, who is a man of fortune, and drives

" a ſet

" a ſet of horſes. This gentleman keeps no
" land in his own hands, ſo that he was
" for many years obliged to buy all the
" ſtraw uſed for the litter of his ſtables,
" which amounted to a very conſiderable
" quantity: however, when the laſt tenant
" of this farm came to it, having been a ſer-
" vant in the family, he offered to ſupply the
" ſquire with ſtraw for his ſtables, provided
" he might have all the dung except what the
" gardener had occaſion for. The ſquire
" thought this a good propoſal, and the far-
" mer imagined he had the beſt of the bar-
" gain; ſo the matter was ſoon ſettled.

" Now, you are to underſtand, that the
" ſquire kept, beſides ſeven coach-horſes, a
" ſtable of hunters, a number of road-horſes,
" and a pack of hounds; ſo that there was
" on his premiſes, in a year, an incredible
" quantity of rich dung.

" The farmer imagined he was now in a
" fair way of making his fortune; for his
" father had taught him, that the man who
" can command dung, is always ſure of large
" crops: but this did not prove true in the
" preſent caſe.

" To proceed, my predeceſſor went on
" ploughing his land, got his fallows in good
" order, dreſſed them largely with dung, and
" always ſowed them with wheat.

" His crops of this noble grain, however,
" by no means anſwered his expectations: his
" wheat

" wheat conſtantly looked well and promiſ-
" ing, in winter and the early part of the
" ſpring of the year; but as it advanced, it
" grew rank; and at harveſt, was either run
" all to ſtraw, and was beſides very ſmutty;
" or elſe, if a heavy ſhower of rain happened
" to fall, it was lodged, matted, and grew.
" This was, indeed, a very mortifying cir-
" cumſtance, but our farmer could find no
" remedy for it. He ſeveral times, without
" ſucceſs, tried folding ſome ſheep on his
" wheat: but this part of Huſbandry, for
" want of ſkill, he managed ſo badly, that
" he loſt two entire crops: for he had ſcarcely
" the return of his ſeed at harveſt. This
" could never hold long; ſo that, in the end,
" he was, as I ſaid before, broke and ruined.

" This man never could be perſuaded, that
" any part of his loſs was to be attributed to
" the dung he laid on his land; though he con-
" ſtantly manured it with horſe-dung, before
" it was half-rotten; and without any mix-
" ture, to allay its great heat. This kept
" the ſoil in a conſtant ſtate of fermentation,
" and ſtocked it with weeds; inſomuch, that
" when I took poſſeſſion of the farm, ſome of
" the ſoil was abſolutely mouldy, and ſtunk
" again, it was ſo rank.

" I will now inform you of my mothod
" ofmanagement, that you may be able to judge
" how far I was benefited by the errors of my
" predeceſſor.

" I found

" I found ſixty acres of fallow, ready for " ſowing with wheat: theſe, as the land " was rank, I ſowed with the winter tare; " which I knew by experience would choak " the weeds, and abate the rankneſs of the " ſoil. In ſome parts, where the ſoil was " not ſo rank, I ploughed-in the tares, in or- " der to ſow wheat over them. In other " parts, I ſuffered the tare to ſtand for a crop; " which however was not conſiderable, they " ran ſo much to ſtraw or haulm.

" When the tares were off, I got the land " inſtantly in order, and ſowed the whole " with wheat, of which I had a better and " cleaner crop, than had been known upon " the land for upwards of ſeven years before; " this all my neighbours acknowleged. How- " ever, it was neither clean enough, nor " conſiderable enough, to ſatisfy me. Some " of your readers may perhaps wonder, what " I did with my tares, as but few are ſold at " the country markets: but I muſt inform " them, that I live within ten miles of a " ſea-port town, whither I ſent them at va- " rious times, in order to their being carried " by ſea to London.

" I am to obſerve to you, that I continued " the agreement, of giving the ſquire ſtraw " for his dung: but I made uſe of it very " different from my predeceſſor.

" I make it a rule, never to manure for " wheat, or ſow wheat on a fallow. I do

" not

" not indeed allow many fallows on my land;
" and when I do, I generally ſow my fallow
" with barley, to which I allow four or five
" ploughings. This commonly yields me a
" large return, and I have a good crop of
" wheat after it.

" This, however, is not my general me-
" thod: for I am very fond of the Hoeing
" Huſbandry; to practiſe which in ſome de-
" gree, is the only infallible way of keeping
" land clean. To begin then with my me-
" thod; I never lay any dung alone on my
" land, let it be ever ſo rotten; but as ſoon
" as I get any long dung from the ſquire's, I
" carry it to my compoſt-heap, where it is
" mixed in alternate layers, or beds, with
" freſh virgin-earth (if I can get it), lime or
" chalk, lime-rubbiſh, ſcourings of ditches
" and ponds, turf, leaves of trees, and all
" the dung and offal of my family, of the
" hog-yard, the poultry-yard, and the dog-
" kennel. As to my pigeons dung, I always
" preſerve it to mix with ſoot, and uſe the
" mixture as a top-dreſſing for my wheat,
" whenever it happens to be too backward in
" the ſpring.

" But to return to my compoſt: I have al-
" ways ſeveral diſtinct heaps of different
" ages, and I ſometimes leave it three years
" before I uſe it; and never lay on any under
" three years old.

" When I have got a plot of ground in or-
" der, I give it a thorough-good dreſſing of
" this

" this compoſt, which I immediately plough
" in. I then ſow it with ſome crop that re-
" quires hoeing, ſuch as horſe-beans, broad-
" beans, or white or grey peaſe. During the
" whole ſummer, I take care to keep theſe
" crops very clean, by hoeing, eſpecially if
" the ſeaſon is rainy; and I am particularly
" cautious in preventing any of the weeds
" from perfecting the ſeeds.

" When my hoeing-crop, which generally
" more than pays me all my expences, is off
" the land, I immediately get it into as fine
" tilth as I poſſibly can, by repeated plough-
" ings; and then ſow it, either with wheat
" or barley, whichever is likely to pay me
" beſt: for, little as ſome of your readers may
" think of it, barley, when it is ſown on
" good land, well prepared, is very frequently
" as profitable as a crop of wheat.

" By thus ſowing my wheat, after a hoe-
" ing crop with dung, I have always a good
" return of clean corn, often five quarters on
" an acre; and my land will ſtill be in heart
" enough, to give me a reaſonable crop of
" oats; after which, without any fallow,
" comes my hoeing crop, &c.

" When I ſow barley after the hoeing
" crop, I ſuffer wheat to follow it; and then it
" is that, if I find it neceſſary, I give the
" wheat in the ſpring a top-dreſſing of ſoot,
" mixed with pigeons dung.

" I ſometimes allow only ſix pecks of " ſeed-wheat to an acre: this is when I ſow " over it, in the ſpring of the year, eighteen " buſhels of broad-clover-ſeed; which I har- " row in with a pair of very light harrows, " and it does not in the leaſt damage my " wheat-plants. I leave the clover only two " years on the land: for the ſecond year after " I have mown the firſt crop for hay, I ſuffer " the ſecond to grow very rank (having " given my land a ſlight dreſſing from my " compoſt dung-hill the preceding year) " which I plough in, and over it ſow wheat, " to be harrowed in at once ploughing.

" Theſe crops of wheat are ſmaller in " quantity than any others I get; but the " grain is finer, plumper, brighter, and hea- " vier, generally ſelling for more at market, " as being always very clean, and clear from " ſeeds of weeds.

" In my method of farming, ſome parti- " culars are to be noted. In the firſt place, " as my crops ſucceeded one the other very " quick, I am under a neceſſity of having all " my ſtubble extirpated, before I give the " land the firſt ploughing after the crop is off. " If it is a wheat or bean ſtubble, I generally " have it all pulled up by hand by women " and children; barley and oat-ſtubbles I " have torn up by a pair of loaded drags, and " afterwards gathered into heaps, and carted " to the compoſt heap. This I do to prevent

" the

" the ſtubble from being buried by the plough,
" and from growing mouldy in the land:
" from which mouldineſs, I have great reaſon
" to think, ſmut proceeds.

" Another thing to be noticed is, that I al-
" low leſs ſeed to my land than moſt of my
" neighbours; my quantity being from ſeven
" to nine pecks of wheat, from nine to twelve
" of barley, and about twelve of oats, to an
" acre of land: but it is always to be pre-
" ſumed, that the ſeed I ſow is good. If
" any farmer ſhould imagine, that theſe
" quantities are too ſmall, let him ſuppoſe
" every wheat-plant to occupy a ſpace of ſix
" inches ſquare, which is ſmall enough; let
" him then calculate, how many ſuch ſpaces
" there are in a ſquare acre. When he has
" done this, let him proceed to count how many
" grains of wheat there are in a pint, which
" multiply by the number of pints in nine
" pecks, and he will find, by the reſult, that
" I, in fact, allow too much ſeed."

In the third volume of the Muſeum Ruſticum, p. 151. an old Norfolk farmer gives a very ſenſible account of his management of wheat crops, reſpecting the feeding down wheat in the ſpring, with ſheep; and then concludes, as follows;

" We muſt not always judge the farmer's
" profits by the produce of his land, which
" ſome of your readers may think odd; but

" I will make it appear by an example from " my own practice.

" In the year 1743, I had two fields of " twenty acres each in wheat; one of which " yielded me at harveſt, at the rate of four " quarters an acre throughout; the other " yielded me only twenty buſhels, one acre " with another: yet I got more by the laſt " than the firſt. The caſe was thus: falling " ſhort of dung, I was obliged to buy; but " it was ſo dear, that I only bought enough " for the firſt field, giving the other two " ploughings extraordinary, inſtead of ma- " nuring it; and theſe ploughings I reckon " at a mere trifle, as my horſes would other- " wiſe have ſtood ſtill."

The importance of manures in the common practice of farming is known, and generally acknowledged: but of late, ſome writers on Agriculture have contended for ſuch an univerſal uſe of them, as ſeems to reſolve this art to the ſingle point of collecting and applying immenſe quantities of dung to their arable land. They endeavour to perſuade their readers in the ſtile of the above Eſſex farmer's father, " that the man who can command " dung, is always ſure of large crops." A very fallacious rule, if adhered to literally; though of great uſe, when applied with judgement: as appears by the different ſucceſs of thoſe two farmers on the ſame land. A diſtinction ought to be made in the culture of plants

plants for feeding cattle: for them dung and manures are particularly uſeful, becauſe they promote a great luxuariancy in theſe plants, which is much for the farmer's profit: but a luxuriancy in wheat, and other corn, is ſo far from being beneficial, that it is often hurtful, producing much ſtraw, and but little good corn; ſuch groſs crops are alſo the moſt liable to diſtempers, and to be blighted and lodged. This may be ſaid in general of all plants cultivated for ſeed; and may be obſerved alſo in gardens. I have cultivated radiſhes in a rich ſoil, which have grown remarkably large, have ſpread greatly, and continued all the ſeaſon to produce many bloſſoms and pods, but not one ripe ſeed.

The above Norfolk farmer's two fields of wheat ſhews the difference of profit of tillage and manure. One that produced but twenty buſhels of wheat per acre, was more profitable to him, than thirty-two buſhels per acre produced by the other. The difference in the two crops, being twelve buſhels per acre, was in a great meaſure owing to the dung, whereof the other field had none. But farmers ſhould conſider, not only the crops, but the expence attending them. The two ploughings extraordinary might coſt about eight or ten ſhillings, or the value of two buſhels of wheat, which being deducted from the other greater crop, there remains ten buſhels;

to obtain which, coſt the farmer about 2 l. 10 s. per acre, or upwards.

It is indeed remarkable, that two common ploughings ſhould, in point of profit, exceed a dunging, and is a ſtrong argument in favour of tillage, and of the New Huſbandry: for in that method, the tillage is performed in a manner more advantageous to the crop, and alſo much cheaper, than common ploughing.

The common reckoning of the price of dung per acre, is from three or four to five pounds: but the dung does not advance the crop to that value beyond a drilled and horſe-hoed crop; as appears from what has been ſhewn above of the hoed crops. And it has been alſo ſhewn, that horſe-hoed crops of wheat may be, and actually have been, repeated many years, without intermiſſion, and without manure.

In the old method of farming in England, a fallow once in three or four years was thought neceſſary, and by moſt farmers is thought ſo ſtill. But of late years it has been found by the more curious, that fallowing is not neceſſary; and that land may be kept in heart by a change of crops only, and without fallowing. This ſaves the expence of rent and fallow every third or fourth year, and is undoubtedly a great improvement in Huſbandry. Yet the Hoeing Huſbandry is ſuperior even to this new mode of culture, wherein the farmer's aim is to obtain a crop

of

of wheat every third year, or, at moſt, every ſecond year; wheat being univerſally by them eſteemed to be their principal and moſt profitable crop, to obtain which is the chief intent of fallowing; and the intermediate crops of beans, peaſe, &c. are allowed to be inferior to wheat. But in the New Huſbandry, the farmer obtains a crop of wheat every year: or, if he has a mind to change ſometimes for any other crop, or is obliged to do ſo, as Mr. Craik does, from a peculiarity of ſoil or climate; he can do it to as great advantage as the common farmer, or more ſo; hoed crops being generally more profitable than the broadcaſt.

Upon the whole, the reader may perceive, how groundleſs is the aſſertion of the author of the Farmer's Kalendar, that "were ſuch "ideas (as thoſe of the New Huſbandry) "to become general, it is inconceivable how "much miſchief they would occaſion; and "that there cannot be more falſe principles, "than thoſe whereon they are built:" which before any author had preſumed to aſſert, he ought to have underſtood them, and to have diſproved them by a fair trial; or acquainted his readers, where they were diſproved by perſons of character: but this was not in his power to do. Theſe principles are founded upon truth and nature; they have been proved by the moſt accurate experiments, and by ex-

tenſive practice, on various ſorts of land, and cannot be diſproved by negative arguments.

Though the horſe-hoed wheat crops are very profitable, farmers are not adviſed to go largely into that Huſbandry at firſt, becauſe it requires more ſkill and attention in the management, than other crops that do not continue ſo long upon the ground: for which reaſon the farmer ſhould begin it at firſt upon a ſmall quantity of land; and encreaſe it, upon further experience.

Mr. Tull at firſt drilled three or four rows upon ſix-feet ridges, afterwards two rows only upon narrower ridges, as mentioned above. But the moſt perfect culture in this Huſbandry, is of ſingle rows upon ridges: for where there are two or more rows upon a ridge, the partitions between the rows cannot receive the full benefit of the horſe-hoeing, and are cultivated only with hand-hoes; and it is difficult to get the weeds clean out of the rows. It ſeems to have been for theſe reaſons, that the very ingenious author of this Huſbandry began, towards the latter end of his practice, to try the culture of ſingle rows of wheat upon ridges; which he thought might anſwer, if ſingle rows of Smyrna wheat were drilled upon ridges three feet and eight inches broad. This wheat has one large middle ear, with ſmaller ears growing out from the bottom of the middle ear, and all round it; he was promiſed ſome of this wheat, but diſappointed;

pointed; and he thought the white and grey cone (the ſorts he commonly cultivated with the horſe-hoe) were not large enough to be drilled upon ridges in ſingle rows; and, I believe, has not been tried in this manner; but there is another method, that has been tried with ſucceſs, which the farmer may practiſe with ſafety, till he is well acquainted with horſe-hoeing double rows upon ridges. This is, to drill his wheat in ſingle equidiſtant rows, of two feet or thirty inches aſunder, with about two pecks of ſeed per acre, if ſown early. The thirty-inch ſpaces ſhould be cultivated with a ſmall ſwing-plough, (in the manner the ridges are hoed) the firſt hoeing before winter, taking care that the plants of young wheat are not covered with the mould falling upon them. In this way, the wheat ſhould not be hoed on both ſides of the rows at once, for that would leave them too much expoſed; as the plough ſhould go within two or three inches of the wheat: but the rows ſhould be hoed alternately, one of the ſpaces in autumn, and the next to it in the ſpring; and in this manner during the growth of the wheat. If the land is ſo ſtrong, that it would get ſtale and hard before the ſpring-hoeing, the wheat may be hoed alternately in autumn, on both ſides, which is done by returning the earth hoed from one ſide, immediately, or ſoon after it was hoed from the wheat; and then hoe the other ſide, which

may

may lie open during the winter, to carry off the rain-water, and keep the wheat dry till ſpring. The laſt hoeings in ſummer ſhould earth the rows up on both ſides, which will help to ſtrengthen and ſupport the wheat. In this way, there is little occaſion of hand-hoeing, except for the narrow ſlips left by the hoe-plough next the wheat, and the rows are eaſily cleaned of weeds.—Great crops have been obtained in this method of culture, where the rows were but two feet diſtant: but if they are drilled at the diſtance of two feet and an half, the ſpaces may be deeper hoed, which will be more advantageous to the crop and the land: though the two-feet rows are very profitable, and will probably be at firſt preferred by farmers.

It is proper to prepare land well, that is intended for wheat; and, if the land will bear to be deep-ploughed, the crop will be the more plentiful. This is a circumſtance not ſufficiently attended to by many farmers; and ſome writers have been ſo ignorant, as to recommend ſhallow ploughings, as of four or five inches: but plants are nouriſhed by their roots, and the more good well-tilled earth they have to ſpread in, the more vigorous the plants will grow, and the greater crop they will produce. Many inſtances might be given of this; but it may be ſufficient here to take notice, that, in cultivating madder, very little or no manure is uſed, but the land is dug

dug three or four feet deep: the land is employed in the preparation and crop of madder three or four years; and then it is dug up, and well-broken, to get out all the madder-roots, and this digging is alſo about four feet deep: the ſame land is not uſually replanted with madder immediately, but with wheat or other crops for four years or more; not being thought proper for madder, till it has been planted with corn, or other crops, for ſeveral years. Wheat uſually ſucceeds madder, but the land is not dreſſed with dung, or any manure, for wheat; yet it is found, that after ſuch deep digging, if the ſeaſon is at all favourable, they are ſure of a great crop of wheat; and that the benefit of ſuch digging continues for ſeveral ſucceeding crops.

The crop of wheat, cultivated as above, is reaped at a leſs expence than the broad-caſt, and, being perfectly clean from weeds, is ſoon in order to be carried home, which is no ſmall advantage in a catching harveſt.

Good Huſbandmen begin plowing their land early in autumn, to prepare it for the next crop, for which three plowings are often neceſſary, ſometimes more; but the farmer, who underſtands the Hoeing Huſbandry, will not loſe five or ſix months, and be at that expence, merely as a preparation for a crop next ſummer. He may have a crop in winter, which will defray the expence of winter-fallowing, and bring him ſome profit beſides.

Land is not impoveriſhed by a crop, if that crop is well horſe-hoed, as we have ſhewn of wheat crops; and as wheat crops, thus cultivated, do not require manure, the farmer may ſpare ſome manure for a winter crop.—As ſuppoſe his land, in the preſent caſe, is ſtrong, it may be ploughed as ſoon as the wheat is carried off, laid up into five-feet ridges, and immediately planted with a double row of cole-ſeed plants upon each ridge, the rows a foot aſunder, the land being firſt well dreſſed with dung or compoſt. The plants being thus diſpoſed, there will be a ſpace or interval between the double rows, of four feet wide, which is a proper diſtance to give room for the hoe-plough; and theſe cole-ſeed plants, well horſe-hoed and hand-hoed in the partition between the rows, will come forward apace, and produce a conſiderable quantity of good feeding for large cattle and ſheep to the beginning of February, about which time the land ſhould be cleared of all the cole-ſeed plants, and immediately planted, five feet each ridge, with a double row of beans, to be horſe-hoed. Once ploughing of the ridges is a ſufficient preparation for the beans: for it is an advantage peculiar to the New Huſbandry, that one crop may immediately ſucceed another, without further preparation or expence than ploughing once for a new crop. I have propoſed to plant cole-ſeed, as Auguſt is a proper time to tranſplant them for a crop; and they

are

are very good feeding for cattle, and ſo hardy as very rarely to be injured by froſt: If the farmer is ſituated near a great town, the green curled ſavoys, or cabbage plants, &c. for ſale, may be ſtill more profitable to him.—The beans, well hoed, will yield a larger and more profitable crop than in the common way of planting them; and as ſoon as they are cut, the land may be ploughed down level and drilled with wheat, to be cultivated as before.—In this method of cultivating wheat, very good crops will be obtained, but the land is not ſo much improved as it is by the horſe-hoeing of wheat upon ridges; and for that reaſon it will not be adviſeable to attempt raiſing ſucceſſive crops of wheat every year in this method of drilling it upon the level, as may be done upon ridges. Yet in this way the farmer will find it much more profitable than the Old Huſbandry, and the moſt approved courſe of crops in that Huſbandry, viz. turnips, barley, clover, and wheat; for in this courſe the farmer can have but one crop of wheat in four years, whereas in the hoeing method juſt mentioned he has two crops of wheat in four years, better crops than he commonly obtains in the Old Huſbandry, and at a leſs expence, beſides the advantage of the winter crop of cole-ſeed for his cattle.—And when he is ſo expert in the hoeing, as to undertake the culture of wheat in the beſt horſe-hoeing method as deſcribed above, he may

have

have a crop of wheat every year upon the ſame land, to much greater profit than any courſe of crops in the Old Huſbandry, as we have ſhewn above.—If the land is not very ſtrong, inſtead of beans, the farmer may raiſe a crop of carrots or potatoes after the wheat, and thus have wheat and potatoes, or wheat and carrots, alternately.

Having ſhewn that wheat and beans are cultivated to greater profit in the New than in the Old Huſbandry, I ſhall proceed to ſome other crops, and prove the advantage of hoeing, by a fair compariſon of both at large. We have an example of this in the culture of turnips by Mr. Wynn Baker, near Dublin, which, in his report to the Dublin Society, he relates as follows. He prepared land for ſeveral different crops, whereof part was turnips; this was five times ploughed, and laid in five-feet ridges. Compoſt was laid in the furrows between the ridges, which were at the laſt ploughing turned back upon the compoſt, and a ſingle row of turnip-ſeed was drilled upon the middle of each ridge over the manure. Half an acre was ploughed ſix times, dreſſed with the ſame compoſt as the ridges (but with double the proportion that was given to the land in ridges), and he ſowed it with turnip-ſeed, broad caſt; at the ſame time the ridges were drilled, viz. the 14th of July.

" The half acre before mentioned," ſays Mr. Baker, " I manured with at leaſt double " the proportion of compoſt that was allowed " to the other part of the fallow, as it was " flat, and it was neceſſary to manure every " part of it, being intended for turnips, to " be ſown in the promiſcuous way, or broad " caſt: to this piece of ground I gave a ſixth " ploughing, as it could not have the benefit " of the horſehoe, when cropped; and there- " fore I thought it neceſſary to reduce it as " fine as poſſible, in order to give the broad- " caſt crop of turnips every advantage I " could.—My turnips ſhould have been ſown " at leaſt three weeks earlier; but the immo- " derate and continual rains of the preceding " winter involved me ſo much with my ſpring " ſowing, that I could not accompliſh my " turnip-ſowing earlier. When the drilled " turnips were about three inches high, I " thinned them by hand, as being much " preferable and more expeditious than any " inſtrument, intending to have them ſingled " out to about one foot aſunder in the rows; " but, it being ſo new a work, the women " could not be brought to do it effectually at " once, they apprehending that the whole " crop would be loſt, and arguing that they " were ſure there was already too much " ground allowed to one row: under theſe " circumſtances, I could not get this work " done quite to my mind this year; as I had,

" beſides

" beſides this field, two others ſown in the " ſame way, amounting in all to about " twelve acres.—Theſe turnips were horſe- " hoed upon the 17th of Auguſt, for the firſt " time, by taking off, at one furrow of the " plough, only one ſide of each ridge, cloſe " to the plants; thus they remained till the " 25th, when I run the plough in the ſame " furrow; by which, with the firſt furrow, " I ploughed about twenty-one inches deep. " This being finiſhed, I immediately returned " the earth back to the plants; this afforded " them freſh nouriſhment; and, in order to " give rheir roots time to penetrate this freſh " earth (which by the horſehoeing was be- " come very fine mould), I let them remain " in this ſtate till the 12th of September, " when I horſehoed them again, by taking off " the other ſide of every ridge, and on the " 20th deepened the furrow in the ſame man- " ner as the former, and immediately returned " back the mould to the plants, and on the " 18th of October threw up a ſmall furrow " on each ſide of every ridge, which finiſhed " the culture of theſe crops, and reſtored the " ridges to the form in which they were " when the plants were put out upon them." —This is his deſcription of horſehoeing the cabbages he had planted in the ſame field; and he refers to that account for the turnips, which, he ſays, were horſehoed in the ſame manner, and nearly at the ſame times, as

theſe

theſe cabbages, " with this difference only, " that I deepened the furrows of but a few " ridges of the turnips in another field by a " ſecond ploughing in the ſame furrow, " which I did not find to benefit the turnips " much; for, if the ground is well prepared " before the ſowing, the depth of one furrow " will be enough for the turnips, provided " that be deep and bold.

" Thinning the turnips in drills by hand " coſt me eight-pence an acre; weeding " them coſt me four-pence; and the repeated " horſe-hoeings about fourteen pence an acre " for workmen's wages, excluſive of the " horſes; of which I generally uſed two, " except in very hot days, and then I found " three were neceſſary.—The broad-caſt tur- " nips were carefully thinned by hand, when " they were about two inches high, which " the women did with more courage than " they did the drills; and ſome time after- " wards I hoed them once, and weeded them " twice. Thinning them by hand coſt me " four ſhillings. Hoeing them afterwards " coſt eight ſhillings, and weeding them coſt " me two ſhillings and four pence. They " were ſcarcely half an acre; this expence " being therefore doubled, they coſt me at " the rate of twenty-eight ſhillings and eight- " pence an acre, over and above the extraor- " dinary ploughing and double proportion of " manure. In truth, this crop greatly ex-

" ceeded my expectations, being by far the " beſt I ever had in the broad-caſt way; but " I attribute their ſucceſs wholly to the thin- " ning them by hand; for two, three, four, " and often five more turnips will be ſo united " and interwoven, that it would be impoſſible " for the moſt dextrous hoer to ſeparate " them; whereas the fingers and thumb will " preſerve the maſter plant, whilſt the others " are moſt conveniently drawn from it by the " other hand of the perſon employed. Add " to this, that there is no labour in which we " are more liable to be deceived than in tur- " nip-hoeing.

" December the 17th I meaſured out three " ſquare perches of the beſt of the broad-caſt " turnips, and alſo three ſquare perches of the " drilled; and the produce was as follows:

	C. q. lb.	T. c. q. lb.
" Three perches of the drilled weighed	17 2 21, which	47 2 3 2
" is *per* Acre		
" Three ditto of the broad-caſt	16 1 0, which	43 5 3 6
" is *per* Acre		
" In favour of the drilled		3 16 3 14

" Thus we ſee, that, notwithſtanding the " extraordinary proportion of manure, and the " extraordinary ploughing, which was af- " forded to the broad-caſt turnips, the drilled " crop, with intervals of five feet, produced " the greateſt quantity upon an acre.

" It now remains to deſcribe the nature " and quality of the land. The land lies

" upon

" upon a lime-ſtone quarry, which is very " near the ſurface; and is naturally a ſtrong " and ſtubborn ſoil, with an infinite number " of looſe lime-ſtones in it. With dry " winds, or a parching ſun, the ground " unites, and is as hard as bricks; moderately " wet, it is reducible by inſtruments; but " when thorough wet, it runs together; and " is like brick-clay, when tempered. This, I " repeat it, is the natural quality of the " land, and is what the writers would call " a barren, grey, ſtiff earth, but is not quite " a clay. I have found repeated tillage, when " the land is in a proper ſtate of moiſture, " will reduce it, and diveſt it of its natural " adheſion. Tillage and manure together " render it capable of producing any thing; " as I believe ſuch agents will do upon any " land, provided it can be kept moderately " dry. The fields which I had under turnips " and cabbages have been in appearance all " the ſummer a fine loam, and really bore the " complexion of very fine land, abſtracted " from the rich appearance of the crops."— Upon this accurate experiment, we may make the following remarks.

1. He acknowledges a partiality ſhewn to the broad-caſt turnips, in beſtowing upon them a double quantity of manure, and an extraordinary ploughing, which doubtleſs made that crop conſiderably greater than it would have

been with only the ſame tillage and proportion of manure.

2. Ridges four feet broad are ſufficient for turnips for feeding cattle, as was experienced by Mr. Tull, and by others ſince. Upon four-feet ridges the crop would have been greater than upon thoſe of five feet, in the proportion of five to four; and the crop would have been 58 tons, 7 c. 21 lb. viz. 2 tons, 13 c. 1 qr. 11 lb. more ſuperiority per acre than computed by Mr. Baker.

3. The expence of the broad-caſt was much greater than of the drill, for the broad-caſt coſt 1 l. 8 s. 8 d. per plantation acre, and the drilled coſt but 4 s. 2 d. per acre, reckoning the horſes at one ſhilling a day each, which is a good price there: ſo that the expence of cultivating the broad-caſt turnips was above ſix times as much as for the drilled. This difference is very great, and would amount to a large ſum in cultivating turnips extenſively.—The drawing up and carriage of the broad-caſt coſts alſo more than the other; and if not drawn all clean up, what is left in the ground will grow, and damage the next crop, eſpecially if that is barley.

4. The land where the broad-caſt turnips grow becomes hard and ſtale, and will require ſeveral poughings to bring it into fine tilth for another crop: whereas land that has been horſe-hoed is in fine tilth, while the crop of turnips are growing upon it (as Mr. Baker

Baker takes notice the cabbage-ground was, with the ſame tillage); and therefore this land required only once ploughing of the ridges to prepare it for the next crop; and ridges are alſo ploughed with leſs labour, and at fewer furrows, than the ſame extent of land that lies level.

5. Land lying in ridges is not only ploughed and prepared for a ſucceeding crop in a ſhorter time, and at a leſs expence, than land that lies flat; but the earth of the horſe-hoed ridges is likewiſe much richer, though it produced a larger crop than the level ground ſown broad-caſt. For the land that is ploughed deep, turned, and a new ſurface expoſed to the air at every horſe-hoeing, is receiving new ſupplies of the pabulum, aliment, or food of plants, all the time it is thus cultivated; and the level ground, not cultivated with the hoe-plough, is loſing the vegetable aliment all that time. If the ſucceeding crop requires ridges of the ſame breadth, all the cultivator has to do is, to plough back the ridges upon the preſent furrows, and then the middle of the new ridges will be compoſed of fine earth, well pulverized by the former horſe-hoeings, and impregnated with nutritious aliment received from the atmoſphere.

6. We ſee, in the preſent caſe, that the horſe-hoeing makes a great ſaving of manure; half only of what is given to broad-caſt turnips was made uſe of here; and, in ſome

crops, as wheat, no manure is neceſſary; hoeing alone is ſufficient to nouriſh the growing crop, and to enrich the land for the ſucceeding one.—Many other examples might be given of the enriching effects of deep hoeing; but theſe may be ſufficient as a ſpecimen.

There is a method of culture lately practiſed and recommended: which is, in ſome meaſure, upon the principles of the New Huſbandry, and ſaid to be ſuperior to it. The invention of this method has been attributed to Dr. Hunter of York, and to Mr. Melvill of Lincolnſhire. I know not which of theſe gentlemen introduced it, but the latter deſcribes it as follows:

"It will be almoſt unneceſſary to obſerve, "that weak arable lands have been reſtored "by means of a fallow, which the judicious "huſbandman makes more or leſs frequent, "in proportion to the poverty of the ſoil. "Upon the high wolds in this country, and "in Yorkſhire, where the ſoil is poor and "thin, oats and barley are principally culti-"vated. The uſual Huſbandry is one crop "and a fallow; and in ſome places, where "there is a greater poverty of ſoil, they take "one crop, and then let the land reſt for "ſome years, to recover itſelf. This laſt is "ſomething like the Huſbandry of the wild "Arabs.

"Being greatly diſſatisfied with the above "manner of cultivation, I employed myſelf

"ſome

" ſome years ago in forming another, which " might be more conſiſtent with the laws of " vegetation, as well as œconomical Huſ- " bandry. The ſyſtem that I have adopted is " as follows, viz.

" Inſtead of having the land laid out in " broad ridges, I order them to be made only " nine feet wide. When the ſeed-time comes, " I ſow every other land broad-caſt, and har- " row-in the grain in the uſual manner. " The intermediate ſpaces, which I ſhall call " the fallow-lands, are ploughed two or " three times, at proper ſeaſons, by a light " plough, drawn by one horſe, in order to " make a clean fallow for the ſucceeding crop. " Upon theſe lands the ſeed is ſown as before. " The ſtubble, in turn, becomes the fallow, " and is treated accordingly. In this alter- " nate way, I manage my weak arable lands, " and I have the ſatisfaction to find, that " very little manure is required; which is a " moſt agreeable circumſtance, as ſuch lands " are generally remote from a large town. I " dare venture to ſay, that the ſame field, " managed in this alternate way for two " years, will be found to produce one-third " more corn, than when cultivated in the " uſual manner, by a crop and a fallow, and, " at the ſame time, be attended with much " leſs expence to the owner.

" This ſeeming contradiction will be rea- " dily removed, when we reflect, that vege-

" tables, no more than animals, can continue " long in a ſtate of health, without the free " enjoyment of air. In a large field, when " the weather is calm, the air remains in a " ſtate of ſtagnation; whereby the perſpira- " tion of the plants is permitted to remain " too long upon the ears of corn. Hence " many inconveniences ariſe to the crop. On " the contrary, in the Alternate Huſbandry, " the air is conſtantly in motion; the interme- " diate fallows ſerve as funnels to carry it off, " and along with it all ſuperfluous moiſture.

" In conſequence of this freedom of air, " upon which I lay a great ſtreſs, the ears of " corn are always obſerved to be well fed, and " the ſtalks firm and ſtrong. When by ſe- " vere weather the corn happens to be laid, " it is thrown upon a clean fallow, where it " has no chance of being bound down by " weeds. It is conſequently ſooner raiſed by " the current of air which is conſtantly paſ- " ſing along the fallows.

" Turnips, or, when the ſoil is deep and " ſandy, a few carrots or potatoes, may be " placed upon the intermediate lands. But I " have always found it beſt, to keep them as " perfect fallows. Every thing that grows " takes ſomething from the ſoil; and as our " land is ſuppoſed to be poor, and not ſup- " ported with much manure, we ought not " to ſuffer the ſmalleſt vegetable to take root " upon it.

" If the farmer chuſes, he may vary his " crops;

" crops; but I am of opinion, and I ſpeak " from ſome experience, that the ſame grain " may be cultivated as long as he pleaſes " upon lands managed in the manner that I " have recommended. In conſequence of " this happy diſpoſition of the ſoil, every " kind of grain may be ſuited to the land moſt " proper for it. I do not confine the Alter- " nate Huſbandry to oats and barley; I have " ſucceſsfully followed it upon good wheat- " land; and, if the farmer attends to his bu- " ſineſs, he will find his wheat-crops greatly " to exceed his expectations. Near twenty " buſhels of wheat may be got annually from " one acre of land cultivated in this alternate " way, and with little expence of manure.

" I acknowledge, that many of theſe ad- " vantages are in common with the Drill " Huſbandry; but I flatter myſelf, that there " are others, which that ingenious ſyſtem " does not enjoy.

" I know it will be objected, that, in this " manner, the fallows will be loſt to the " ſheep during the ſummer months. I an- " ſwer, ſo much the better; if poſſible, the " fallows ſhould not be permitted to bear " a ſingle leaf. The farmer ought to find " other ways to ſupport his ſheep; and, if he " is an intelligent man, he will readily do it. " It is an odd kind of Huſbandry, when the " fields bear corn one year for the owner, and " the next, weeds for his ſheep.

" When

" When firſt I practiſed the alternate Cul-
" ture, I was apprehenſive that the pigeons
" and crows would prove my greateſt enemies,
" by ſettling upon the fallow-lands, and pulling
" down the ears of corn. I have now the
" pleaſure to aſſure the public, that, after
" ſome years experience, I find my lands no
" more liable to thoſe depredations than the
" neighbouring ones.

" The lands cultivated in this way, being
" clear of weeds, require conſequently but
" little manure. They are always in excel-
" lent tilth; and as their ſurface is frequently
" changed, they have every opportunity of
" drinking up the nutritious matter of the at-
" moſphere.

" I have the ſatisfaction to find, that in-
" cloſures are begun upon the Lincolnſhire
" and Yorkſhire wolds; in conſequence of
" which, a greater quantity of corn will be
" produced for a few years than formerly.
" To thoſe gentlemen whoſe eſtates lie in
" thoſe countries, or in ſimilar ones, I beg
" leave to recommend the Alternate Huſban-
" dry. I dare venture to ſay, that, in point of
" profit and convenience, it will be found
" greatly ſuperior to the Drill Huſbandry.
" The implements uſed are thoſe of the coun-
" try; and the mode of cultivation is within
" the capacity of the meaneſt ploughman."

Though

Though the Alternate Huſbandry is a cheap method of culture, Mr. Melvill is much miſtaken in ſuppoſing it to be much more profitable than the Drill-Huſbandry; as will appear from a fair compariſon. Premiſing, that more than twice ploughing is neceſſary in fallowing, to keep down the weeds, which continue growing ſeven or eight months, in which time a fallow ſhould be ploughed, at leaſt, four times; and ploughing with one horſe is quite inſufficient to plough the land to a proper depth: but, to give this Huſbandry every advantage, we ſhall charge no more to it for theſe than he has ſtated. Some manure he acknowledges is neceſſary in the Alternate Huſbandry, but not how much. A common dreſſing with dung, to be carried ſome diſtance, as in this caſe, coſts for the dung, carriage to the land, and ſpreading, from three to five pounds an acre; and admitting it can be done here at the loweſt rate, three pounds per acre, and alſo that a quarter dreſſing is enough for this land, the expence of manure, at the loweſt, will amount to fifteen ſhillings an acre. Let us ſuppoſe the field to be cultivated meaſures twenty acres. In the Alternate Huſbandry, half or ten acres is fallow, and the other half or ten acres produces a crop of wheat every year. The expence in the Alternate Huſbandry is, for rent of twenty acres, at ſuppoſe only five ſhillings an acre, five pounds; twice ploughing the fallow, at only

only three ſhillings an acre, is, for ten acres, thirty ſhillings. And ſeed-wheat for the other ten acres, twenty-five buſhels, at five ſhillings per buſhel, is 6 l. 5 s. Reaping the wheat, five ſhillings per acre, 2 l. 10 s. In all, 15 l. 5 s. The crop is twenty buſhels an acre, which is two hundred buſhels on the ten acres, at 5 s. per buſhel, is 50 l. from which deducting the rent and expences, 15 l. 5 s. there remains 34 l. 15 s. clear profit on the twenty acres. In the Drill-Huſbandry, the whole twenty acres produces every year a crop of wheat; and the land being deep horſe-hoed, and no weeds, will produce twenty buſhels of wheat per acre at leaſt, or as much as it does with the ſhallow ploughing in the Alternate Huſbandry; and ſo much Mr. Tull's ordinary land did produce, on a medium of about ninety acres; and his meaſure was the common meaſure of that country, viz. nine gallons to the buſhel; ſo that his crop was about twenty-two buſhels and a half per acre, Wincheſter meaſure; though his land that year was not in the beſt order, on account of his being diſappointed of a tenant, as was taken notice of above. Now we have ſhewn, that eight buſhels of wheat paid all Mr. Craik's expences of cultivating an acre of his land, viz. of a Scotch acre, which is an acre and a quarter Engliſh; and, if ſo much is reckoned here per acre, there will remain a profit

profit of twelve bushels per acre, or two hundred and forty bushels upon the twenty acres, at five shillings per bushel, or 60 l. pound profit upon the twenty acres, by the Drill Husbandry; and if every article was stated at the full extent, the profit on the Drill would be double to that of the Alternate Husbandry.

The Alternate Husbandry, as here stated, is, without doubt, a very cheap method of culture, and is founded on a practice somewhat similar to that mentioned by Mr. Tull, in his chapter of tillage, p. 21. "It is of late," says he, "fully proved, by the experience of "many farmers, that two or three *additional* "ploughings will supply the place of dung, "even in the Old Husbandry, if they be "performed at proper seasons; and the hiring "price of three ploughings, after land has "been thrice ploughed before, is but twelve "shillings; whereas a dunging will cost three "pounds. This was accidentally discovered "in my neighbourhood by the practice of a "poor farmer, who, when he had prepared "his land for barley, and could not procure "seed to sow it, ploughed it on till wheat seed-"time, and (by means of such additional "ploughing) without dung had so good a "crop of wheat, that it was judged to be "worth more than the inheritance of the land "it grew on."

This passage is quoted by Mr. Maxwell, in his Treatise of the Transactions of the Edin-

Edinburgh Society; to which he adds, that a tenant to Sir John Paterſon, near Edinburgh, being in like manner unable to provide ſeed for his land in the ſpring, kept on ploughing it till autumn, and ſowed it with wheat; and had ſo great a crop, that he was encouraged to continue the ſame method of culture upon great part of his farm; which ſucceeded ſo well, and his circumſtances were thereby ſo much improved, that in ſome years he could have purchaſed the farm.—Theſe are pregnant inſtances of the great advantage of tillage, without dung; and juſtify the retorting, upon the author of the Farmer's Kalendar, what he ſays of the New Huſbandry, and high encomium of dung beyond tillage, "Were "ſuch ideas to become general, it is incon-"ceivable how much miſchief they would "occaſion: for there cannot be more falſe "principles, than thoſe whereon they are "built."

The examples here given may be ſufficient to ſhew, that the New Huſbandry is applicable to many different plants; and it is no leſs certain, that it is ſo in different climates. It ſucceeds when applied to the vines in France and Italy, it has done ſo in ſome of the northern colonies in America, where they cultivate a great deal of maize or Indian corn, by hand-hoeing; but a perſon there, having a mind to try hoeing ſome of it with a plough, though not performed in the beſt manner, the ſucceſs was

was ſo great, that ſome farmers who ſaw it were ſo much ſtruck with it, that they immediately attempted to cultivate it in that method, and continue there to do ſo.—In Jamaica likewiſe, and ſome other of the Weſt-India Iſlands, they are extremely attentive to provide great quantities of manure for their ſugar-canes; ſo that they keep there a great number of cattle, for the ſole purpoſe of providing dung for their ſugar-plantations. They likewiſe employ great numbers of negroes to hand-hoe them; yet, notwithſtanding, theſe are all far inferior to horſe-hoeing, an example of which is related by Mr. Miller, in his Dictionary, under the article *Saccharum.*

"I have," ſays he, "been aſſured, by two "of the moſt ſenſible and judicious planters "in America, that they have made ſome ex-"periments of the horſe-hoeing culture for "their canes, which anſwered much beyond "their expectations. One of theſe gentlemen "told me, he planted an acre in the middle "of a large piece of canes, in rows at five "feet aſunder, and the hills were two feet "and a half diſtant, and but one cutting to "to each hill. The ground between the "rows was from time to time ſtirred with the "horſe-plough, to deſtroy the weeds, and "earth the plants. With this culture, the "canes were double the ſize of thoſe in the "ſame piece, which were cultivated in the "uſual way: and when the canes were cut,

"thoſe

" thoſe which had been thus planted and ma-
" naged were ground and boiled ſeparately;
" the produce of ſugar was full as great as
" the beſt acre in the ſame piece, and the ex-
" pence of boiling was little more than a ſixth
" part of the other; and he ſold the ſugar for
" ſix ſhillings per hundred weight more than
" he could get for the other. Theſe
" canes are planted thin for the conveniency
" of horſe-hoeing them; for they are com-
" monly planted a great deal cloſer," as Mr. Miller takes notice. " The diſtance," ſays he, " which the planters uſually allow to
" their canes, is from three to four feet, row
" from row, and the hills are about two feet
" aſunder in the rows; in each of theſe hills
" they plant from four to ſeven or eight cut-
" tings; which is a very great fault, and is
" the cauſe of moſt of their blights, ſo much
" complained of lately: for, if all theſe grow,
" which is frequently the caſe, they rob each
" other of their nouriſhment; and, if a dry
" ſeaſon happens before they have acquired
" ſtrength, they are very ſoon ſtinted in their
" growth, ſo are attacked by inſects, which
" ſpread and multiply ſo greatly, as to cover
" a whole plantation in a little time; when
" this happens, the canes are ſeldom good
" after: therefore it would be the better way
" to root them entirely up, when they are ſo
" greatly injured, for they very rarely reco-
" ver this perfectly: for although the inſects

" are

" are not the cauſe of the diſeaſe, yet they " confirm it, and cauſe it to ſpread."

The diſtance of the rows being uſually but half what was allowed in this experiment, and from four to eight cuttings commonly planted in each hill, and here but one cutting in each, it appears that the planters ſet about ten times the number of canes that is neceſſary or is proper to be done in the New Huſbandry; the great effect of which here is very evident, that deep hoeing with the plough cauſes one plant to produce as much ſugar, and of a much ſuperior quality, as ten plants produce in their common method by hand-hoeing; and this, notwithſtanding the great quantities of the richeſt manure, with which they conſtantly dreſs their ſugar-plantations.

The Weſt-India ſugar-planters are at a very great expence for Negroes, which coſt them fifty pounds and upwards each, and an annual ſupply to keep up the number. A principal part of their employment in ſummer is hand-hoeing their ſugar-plantations; which, though very ſuperficial, is all the culture uſually given them. The Negroes, for their keeping and the number neceſſary to be purchaſed every year, amount to an annual expence of above one third part of all the articles in a plantation; ſo that the ſhallow hoeing of the canes is an exceeding high expence to the planter, though in effect infinitely ſhort of horſe-hoeing. The firſt coſt and keeping

of a great number of cattle, for the ſole advantage of their dung, is another heavy expence. The firſt of theſe, the hand-hoeing, might be entirely ſaved, the hoe-plough, where it comes, rendering hand-hoeing altogether unneceſſary; and a much leſs quantity of dung would do for the canes, if horſe-hoed. The expence would be ſo much reduced, and the crops of ſugar ſo much advanced by this culture, that every planter who adopts it will be a great gainer, and, if generally practiſed in the iſlands, would advance the profits of the planters more than half a million ſterling every year, in the article of ſugar only; and, if extended to other plants here, and to tobacco, maize, indigo, wheat, and other crops on the continent, to which this culture is adapted, the profits to the planters and the public would be immenſe; for it appears that the horſe-hoeing Huſbandry is highly profitable to very many plants; and that the principles of the New Huſbandry are not limited to any one kind of land, nor any one climate, but that they are univerſal.

It was for ſome time ſuppoſed to be only a matter of curioſity, to raiſe annual ſucceſſive crops of wheat upon the ſame land without manure, but it appears to be a matter of great importance; that the hoeing culture is founded upon general principles; that all plants are much improved by hoeing, and large plants particularly by the hoe-plough, much beyond

beyond any other method of culture; and at the ſame time the crops and alſo the land is highly improved by it; and therefore it is hoped that, now the value of it is better known than formerly, it will become more general in Britain and Ireland.

It is indeed ſaid by ſome, the New Huſbandry is unneceſſary when the farmer has great plenty of dung and other manure at a ſmall expence; and it muſt be acknowledged that this is a very favourable circumſtance for the farmer; but this does not exclude the hoeing huſbandry, which is found to be a great benefit to manured land and to the crops. Dung and other manures may be laid upon land too liberally, as was ſhewn in the inſtance of the Eſſex farmer mentioned above; and, though it is acknowledged that greater crops are frequently obtained this way in the Old Huſbandry than in the New without manure, this does not prove that the Old is the moſt profitable. In this caſe a ſeries of crops ſhould be taken for a conſiderable number of years to determine this fairly. With high manuring ten large crops may be obtained in fifteen years; but it may happen, and frequently does happen, that much manure is an injury to the crop, which might do ſo much damage to the five intermediate crops as would much reduce the profits of the fifteen crops upon an average. Very few of thoſe who have practiſed the New Huſbandry have had land that was

good and favourable to that Husbandry, as appears in the examples of it given above. Mr. Craik's is not good land, and his climate is very unfavorable; yet the clear profit of his drilled wheat is to the value of 16 or 18 bushels of wheat *per* acre; the least of these is four pounds an acre: where is the farmer that in the common Husbandry gets so much as four pounds *per* acre for the average crops of his lands that he sows once in three or four years with wheat, and the intermediate years with turnips, barley, and clover? His crops of wheat may be greater than Mr. Craik's; but can he obtain these crops at so small an expence as the value of eight bushels of wheat, or forty shillings? The more manure he lays upon this land, the greater will be the expence of it, and of the carriage and spreading of it; and it is often uncertain, because it depends upon the seasons, whether highly manuring of land shall be a benefit or an injury to a crop of wheat or other corn; for in very dry seasons much dung burns the crop, and in wet seasons it makes the crop too luxuriant, and then it lodges and is blighted.

In many farms, where manure is scarce, the farmer's principal dependence is upon his sheep to dress his land; but, where there are not extensive downs and sheep-walks, the farmer makes nothing of his poor land, nor attempts to do it, for want of manure: many hundred thousand acres, thus neglected, let for

for no more than a ſhilling an acre; and many more, at not more than two ſhillings or half a crown an acre, that might by the New Huſbandry, be advanced to double and triple their preſent value; whereof we have a pregnant inſtance in the high wolds in Yorkſhire near Scarborough, where the land lets at no more than a ſhilling an acre, and though poor, light land, Sir Digby Legard found, by an eight years experience, that profitable crops of barley and wheat were to be obtained from it by the New Huſbandry without manure: for his crops were better than by the Old Huſbandry with manure, and he recommends the Hoeing Huſbandry, even for that land which is ſo light that only one horſe was ſufficient to horſe-hoe it; and by this, he obſerves, it was ſo much improved, that his crops, in the laſt four years, were almoſt double to thoſe of the four firſt.

Many are afraid to hoe light dry land in hot dry weather, being fearful that the heat and drought would burn up their crop; but this is for want of knowing the benefit of deep hoeing, of which the farmer may ſoon ſatisfy himſelf by the following eaſy experiment, viz. dig a hole in the hard dry ground, in the drieſt weather, as deep as the plough ought to reach; beat the earth very fine, and throw it back into the hole; after a few nights dews, he will find this fine earth is become moiſt to the bottom, and the hard

ground all round will continue dry.—Or till a field in lands, make one land very fine by frequent deep ploughings, and let another be rough by inſufficient tillage, alternately; then plough the field croſs-ways, in the drieſt weather, that has continued long dry; he will perceive, by the colour of the earth, that every fine land will turn up moiſt, but every rough land will be dry as powder from top to bottom. Hence it appears, that good hoeing, by opening and pulveriſing the ſoil, lets the dews into it, which penetrates as deep into it, as it is well hoed; and that the moiſture this communicated to it by deep hoeing, is not exhaled by the ſun or drought; but that it continues to retain ſtill moiſture ſufficient to refreſh the roots of plants that grow in it.

This great benefit is obſervable in all land that is well and deep-hoed, and is a ſingular advantage to all plants in dry ſoils peculiar to the New Huſbandry. We find a remarkable inſtance of this related in M. Duhamel's Huſbandry, of ſome cabbages that were cultivated by deep-hoeing; which are plants that require much moiſture: and they were kept ſo moiſt by this hoeing, in dry hot weather, that they ſtood upright, and their leaves remained juicy and criſp: but at the ſame time, ſome of the ſame cabbages, that grew in the gentleman's garden who tried this experiment, drooped in the middle of the day, notwithſtanding their being carefully watered every

day

day by his gardener.—The ſame thing is obſerved by Mr. Wynne Baker, who ſays, that his horſe-hoed cabbages continued upright and in health and vigour in the hotteſt weather, which had a contrary effect upon the cabbages in gardens in that neighbourhood.

This effect of horſe-hoeing is of great importance in light, dry ſoils, cauſing the crops raiſed upon them to grow vigorouſly in hot ſeaſons, that ſcorch and burn them in the common Huſbandry: but the farmer ſhould carefully obſerve, that he will not receive this benefit by hoeing land, that is not firſt brought into fine tilth: for a cloddy, rough ſoil does not drink-in the dews like one that is fine; and, if moiſtened by rain, is ſoon dried again, on a return of drought and hot weather; whereas fine mould is moiſtened by the dews as deep as it is made fine, and is dried by the ſun but a few inches deep.—It is likewiſe a favourable circumſtance to the induſtrious hoer, that the dews are commonly moſt plentiful in the nights when the weather is very dry and hot in the day-time.—Hence it appears, that the dry, waſte lands, whereof there are many vaſt tracts in the kingdom, which are now looked upon as unprofitable, and of very little or no value to the owner or tenant, may, by this Huſbandry, be brought to bear profitable crops; and, if any of them are ſo poor, that they will not yield profitable crops of wheat without ſome manure, a very

little manure, with good hoeing, will cauſe them to yield wheat, or other valuable crops, where none could before be raiſed, and cannot be obtained but by this Huſbandry.—There are ſome lands in every county, and in ſome a great deal, that are ſo remote from great towns, and from the homeſteads of farm-houſes, that they cannot be manured; and where the prime coſt, or the carriage only of manure, would amount to more than the value of the crops. In ſuch ſituations, the New Huſbandry will be of infinite uſe, and more eſpecially ſo, if theſe waſte and unprofitable lands were laid into ſmall farms.

Some have objected to the New Huſbandry, that it cannot be brought into general uſe, becauſe ſome lands lie ſo irregularly, that they cannot be horſe-hoed; which in ſome inſtances is admitted; but all lands that can be ploughed in the Old Huſbandry, may be improved by cultivators, or hand-hoeing, to more advantage than they are ſown broad-caſt.—Another objection, which is of much greater conſequence, is, that clayey, wet lands cannot be horſe-hoed at all; and, if it be true, what a late author hath aſſerted, that two parts in three of all the arable land in England conſiſt of ſuch ſtrong, ſtubborn land, the New Huſbandry for wheat is at once excluded from ſuch land, and cannot therefore be of general uſe.—To this it may be replied, that theſe heavy, clayey, ſtiff lands are of difficult

tillage

tillage in every mode of Huſbandry: but tha they are more ſo in the New than the Old, is ſaid by thoſe who are unacquainted with the New Huſbandry; as will be evident to them who conſider both.—For, admitting that this ſtrong land in the Old Huſbandry is ſummer-fallowed for a wheat crop, whereby it may be brought into tilth, and, being well dunged, is ſown with wheat in September, the crop having no further aſſiſtance till harveſt, or the beginning of Auguſt, ſuch ſtrong land will in all that time, or above ten months, become very hard and ſtale; and a farmer who conſiders it in this light, as growing ſtale, during the growth of every crop, will be ready to conclude, that it will be impracticable, or extremely difficult, to bring the land into proper order, and in proper time, for drilling and horſe-hoeing.—But let thoſe conſider, that land cultivated in the New Huſbandry is never ſuffered to grow ſtale, or out of tilth, as in common ſowing. It will not be denied, that the land may be brought in order for the firſt crop of wheat to be ſown broad-caſt; and that this firſt crop may be drilled in September, and the land brought into this order upon narrow ridges. When this is done, and the wheat has three or four blades, the earth is not then become ſo ſtale, but it may be horſe-hoed, turning a furrow from the rows on each ſide: in the ſpring the horſe-hoeing is to be repeated, the plough going in the

ſame

ſame furrow: and then alſo the land may be hand-hoed in the partitions, between the two rows of wheat; and, as the horſe-hoeings are to be repeated as often as the owner finds neceſſary, the land in the intervals cannot become ſtale; and upon that part of the land which has been kept in fine tilth, the next crop drilled again with wheat, or is to be planted with a winter-crop, which ſhould be done without loſs of time, that the land may carry a crop in winter, to be horſe-hoed; which may be ſome of the cabbage kind, that is moſt ſuitable to the farmer, for all the plants of theſe kinds will grow well upon ſuch land. The farmer ſhould never allow ſuch land to lie idle and grow ſtale. It will bear conſtant cropping, and the hoeing will keep it always in heart: or it may be conveniently dreſſed for any crop, by laying the manure in the furrows between the ridges; upon which the new ridges will ſtand, and the crops planted upon theſe ridges will ſtand over the manure as upon a hot-bed.—Land thus cultivated, being in narrow ridges, and the ploughing and hoeings made deep, the corn or other crops ſtanding high on the tops of the ridges will not be much liable to injury from wet, which may be carried off by means of the deep furrows—The land is ſoon prepared in ſpring for another crop, as of beans; and theſe may be ſucceeded by wheat, for which no other preparation is neceſſary, but

once

once ploughing back the ridges into the intervals, and upon them to drill the wheat.

A common farmer finds it very difficult to cultivate clays, or other ſtrong, ſtubborn ſoils, and concludes that ſuch land cannot be drilled with wheat a ſecond time, thinking it would become hard and ſtale during the growth of the firſt crop of wheat, which he finds it does in the Common Huſbandry. But the management of land, in the Old and New Huſbandry, is ſo different, that the arguments drawn from the Old are often fallacious, when applied to the New: and for this reaſon, ſeveral late writers have erred egregiouſly, when they pretend to condemn the New Huſbandry, though not experienced in it. Thus clays or very ſtrong land become ſtale and hard, while a crop of wheat is growing upon it: but, in the New Huſbandry, land is never permitted to lie unhoed till it becomes hard; and the new crop of wheat is drilled upon the laſt years intervals; which are by deep hoeing kept as fine as garden-mould. The only difficulty is in wet ſeaſons, which require attention.

In this method the farmer obtains every year alternately a crop of wheat and beans, and a winter crop beſides of cabbage-plants. —Or he may have a crop of wheat every year in ſucceſſion, which will require no manure, and only about four hoeings: and theſe, together with once ploughing, to form new ridges,

ridges, upon which the wheat is to be drilled, are only equal in labour to two common level ploughings; which, conſidering that the hoeing of lands in tilth requires but two horſes, or only half the ſtrength that is neceſſary to plough the ſame land when out of tilth, is undoubtedly a very cheap culture, and a method of obtaining good crops of wheat, at a much leſs expence than the farmer can poſſibly obtain them in the Old Huſbandry: to this is to be added the expence of dung, which ſtrong land particularly requires to ferment in it, and help to keep the ſoil open in the Old Huſbandry, but is not neceſſary in the New.

If it is ſaid, that greater crops are produced in the Old Huſbandry than in the New, this is admitted to be ſo in ſome years; but in others the weeds do great damage to the broad-caſt wheat; in hot, dry ſeaſons, much dung is hurtful, and greatly ſo in wet ſeaſons, making the wheat too luxuriant, to run too much to ſtraw, to lodge, and be blighted; this muſt be acknowledged being too common in the Old Huſbandry: and therefore, to make a fair compariſon, we muſt take the crops at an average; and we have ſeen, by the account of two experienced cultivators, that the average crops of wheat in the New Huſbandry were as good as the Old: this may be fairly concluded from Mr. Craik's account of his crops; and Mr. Dean aſſerts expreſſly, that his were ſo upon his ſtrong land, notwithſtanding

ſtanding the difficulty he ſometimes found in catching the critical ſeaſons for hoeing: but this difficulty was partly owing, as he intimates, to the circumſtance of his men and horſes being then otherwiſe employed: for he received his tythes in kind, and employed his own men and horſes to bring it home. A fairer trial of the crops than in his caſe cannot be expected; for he had then practiſed the New Huſbandry for wheat about twenty-four or twenty-five years, and continued it to the time of his death, for about four or five years more, in all about thirty years; and this upon ſeveral fields.

The wheat crops in both methods of Huſbandy being nearly equal, there would be no great advantage in the New Huſbandry, if they were alſo equal in other reſpects, but this is far from being the caſe: for, not to inſiſt at preſent upon other circumſtances, the ſaving of dung is alone a matter of great conſequence. From three to five pounds an acre ſaved in a crop of wheat, is an expence that cannot be balanced by any ſuperiority that even the greateſt favourers of the Common Huſbandry have alledged: but ſome may ſay, what is to be done with the dung and manure, that farmers take ſo much care to obtain, and that they are by all adviſed to provide? The anſwer to this is obvious; wheat and other corn require no manure, or very little, in the New Huſbandry, but potatoes, carrots, cabbages,

bages, and in general all plants and roots cultivated for feeding cattle, and that are improved by a luxuriant growth; to them both manure and hoeing are very beneficial; to lucerne and fainfoin, and to meadows and paſtures: for theſe and ſuch crops manure is highly uſeful, and all that the farmer can ſave from corn, and apply to theſe, will be extremely advantageous to him.

Beſides the ſaving in manure, there is another ſaving made by thoſe who practiſe the New Huſbandry; in wheat, they ſave above two-thirds of the ſeed commonly ſown broadcaſt, which is from eight or nine to twelve pecks per acre; and the quantity of ſeed-wheat upon ridges to be horſe-hoed is only from two to three pecks per acre. If the wheat crop is drilled upon level ground, to be hoed with a cultivator or hand-hoe, half the uſual quantity of ſeed is ſufficient; and the ſaving in ſeed by drilling is commonly more than half, and not leſs for other crops, peaſe, beans, barley, and oats: a ſaving of only half the uſual quantity of ſeed is a matter of ſome conſequence to the farmer, and amounts to a very large quantity to the public; who are greatly intereſted in promoting the New Huſbandry, wherein the crops are raiſed from a much ſmaller quantity of ſeed than was thought practicable before this Huſbandry was introduced.

Another

Another conſiderable advantage is, the cleanneſs of the crops from weeds: a horſe-hoed crop of wheat, if well cultivated, has ſcarce any weeds in it at harveſt, and is fit to be carried home almoſt as ſoon as it is reaped; but ſown wheat, growing upon land much dunged, is ſo full of weeds at harveſt, that it cannot be carried home and houſed or ſtacked ſafely till the weeds are withered: the wheat is all that time expoſed to the weather and other accidents, and does frequently receive much damage by that delay.—Barley and oats ſuffer ſtill more, particularly barley, by the clover uſually ſown with it being often damaged by the clover; and in catching ſeaſons, the crop is ſometimes totally loſt, and the young clover injured, and this notwithſtanding a great expence the farmer is put to, in endeavouring to ſave this crop: ſo that, in wet or very catching ſeaſons, it would be more for his intereſt to mow his barley when in ear, which together with the clover would make excellent fodder for his cattle; and by this means his extraordinary expence would be ſaved, and his young clover would come forward again apace.

When theſe and other circumſtances are duly conſidered, every experienced huſbandman will be ſenſible, that extending the New Huſbandry will be very advantageous to the farmers who practiſe it, and immenſely ſo to the public: for it evidently appears by the examples

examples we have produced of extenſive practice, on various ſorts of land, that it is exceedingly profitable upon them all: ſo that it cannot be doubted, that the extending of the New Huſbandry generally will be an advantage to the public of more than one rent of all the arable lands in the kingdom, not only of land under wheat and other corn, but of other crops; for they are all improveable by the New Huſbandry, and by every mode of good hoeing, particularly when performed by horſes; for by them all hoeing is done in the cheapeſt and beſt manner. The ſuppoſition, that the New Huſbandry will be an advantage to the public of more than one rent of all the arable lands in Britain, thus calculated, is very moderate: for we have ſeen by the foregoing examples of extenſive practice, that much more profit is obtained, where it has been ſkilfully practiſed on land of very different qualities, for wheat and other corn, for a ſucceſſion of years, and wherof the farmers are moſt doubtful: but with regard to ſingle or annual crops, it is ſo evident, that the moſt incredulous do not pretend to diſpute it: turnips, carrots, cabbages, potatoes, and others, are utterly unprofitable and worthleſs, unleſs ſet out thin and hoed; and in every fair trial, the horſe-hoeing is found to excel every other mode of culture. To this ſhould be added, the ſaving of great quantities of manure, now employed for wheat and other corn: which

which, if applied to other crops that now have not enough, will be a great additional profit to the farmer, and this he will obtain by cultivating his wheat and other corn according to the New Huſbandry.

The foregoing inſtances of the culture of wheat, and ſome others, in this Huſbandry, it is preſumed, will be acceptable to all who are deſirous to practiſe it: but as there are others mentioned only in general above, and that have been very lately publiſhed, which may be acceptable to the reader, I ſhall give an account of ſome of them here, as a confirmation of the others; to ſhew that this Huſbandry gains ground, notwithſtanding the unmerited oppoſition made to it by ſuperficial reaſoners and unſkilful cultivators; thoſe, in particular, who draw general concluſions from ſuch ſmall trials as cannot be depended upon in general practice, nor be juſtly made a ſtandard in any Huſbandry, eſpecially by thoſe who are evidently defective in the principles of cultivation: for this reaſon, the above experiments were given, not detached experiments, but the continued practice of the New Huſbandry at large, and in a variety of ſoils; which carry an evidence with them, not to be denied, or ſet aſide, by the partial deductions that are drawn from ſmall or ſingle experiments, made by biaſſed relators, and who omit circumſtances that ought to be particularly related.

I mentioned in general, and from memory only, Sir Digby Legard's practice of the New Husbandry; but this gentleman having great experience in Husbandry, and his letters to the London Society containing so many valuable observations, that, though too long to be all here inserted, an abstract of some principal matters in his letters to the Society of Arts, will without doubt be acceptable to the reader.

In his letter dated from Ganton near Malton, Yorkshire, Jan. 24, 1767, he writes, "About nine years ago, I was induced to begin experiments by an accidental perusal of "Mr. Tull's book of Horse-hoeing Husbandry. The promise of such immense advantages accruing from a particular mode "of tillage, seemingly neither difficult nor "expensive, made by an author of established "reputation, demanded at least a candid trial. "If the author's principles were true, why "not adopt them? On the contrary, if false, "it was high time to undeceive ourselves and "others.

"Though my first experiments did not answer in that degree which I had flattered "myself they would, they, however, encouraged me to proceed: neither were the "faults I committed, nor my ill success, unedifying; since I had the good fortune to "correct the former, and gain experience "from the latter.—Having now practiced "the drill culture constantly during nine "years, as well the horse-hoeing part, as

"that

" that branch of it which conſiſts merely in
" ſowing corn, &c. in equally diſtant rows;
" having applied theſe methods of culture,
" not only to corn, but to moſt of the legu-
" minous plants; and having extended my
" experiments very conſiderably; I may ven-
" ture, at laſt, to recommend zealouſly a
" practice I have always found both enter-
" taining and profitable.

" It is true, many writers on this ſubject
" have given a much more flattering account
" of drilling than I am able to give. If their
" account be not exaggerated, either they
" have been more fortunate than I, in culti-
" vating a ſoil more peculiarly adapted to
" horſe-hoeing; or they have conducted their
" experiments with ſuperior ſkill. However,
" I have never been able, from a ſingle crop,
" in any one year, of any kind of vegetable,
" to obtain a larger produce from the ſame ex-
" tent of equally good ground, where the
" land was laid out in beds [lands or ridges]
" drilled and horſe-hoed, than where the
" corn was ſown at random. Vegetables of
" the pulſe kind are the moſt improved by
" the horſe-hoe; poſſibly as great a crop of
" peaſe, beans, or turnips, may be obtained
" by it. But wheat, barley, or oats, have
" uſually yielded me a third more from ran-
" dom ſowing; that is, if three quarters of
" wheat may be produced from one acre in
" the Common Huſbandry, the ſame ground

" will, *cæteris paribus*, produce no more than " two quarters, when drilled and horſe-hoed. " But the ſuperiority of one method over " another is not to be determined by its ad- " vantage of a particular crop, but by many " ſucceſſive ones, deducting the expences, and " conſidering the nett profits: this I have " done, and the reſult is, that I cannot avoid " giving the preference to the drill ſyſtem.

The actual produce of a field of ſeven acres, horſe-hoed without dung, during eight ſucceſſive years.

DRILL HUSBANDRY.

Years.	A.	Corn ſown.	qrs.	buſh.	p.	Co. reaped.	qrs.	buſh.	p.	Med. Pr.	s.	d.	Value of the crop.	l.	s.	d.
1759	2	Oats	0	1	2		8	6	0		1	6		5	5	0
	5	Barley	0	4	0		10	2	0		2	0		8	4	0
1760	4	Wheat	0	1	3		4	5	0		3	9		6	18	9
	3	Barley	0	2	1		10	2	2		1	6		8	5	0
1761	4	Wheat	0	2	0		5	3	0		3	9		8	1	3
	3	Barley	0	1	2		12	0	0		2	0		9	12	0
1762	4	[Turnips 1 lb.]					[60 tons.]							7	0	0
	3	Barley	0	1	2		7	2	0		3	0		8	14	0
		N.B. Turnips were ſown in the intervals of the barley, worth												3	10	0
1763	7	Barley	0	4	2		22	0	0		3	0		24	4	0
1764	7	Wheat	0	5	2		12	4	2		6	3		31	8	1½
1765	7	Wheat	0	6	2		10	0	2		5	6		22	0	0
1766	7	Wheat	0	5	3		6	5	0		7	0		18	11	0
	56		4	4	1		109	6	0					161	11	0½
Deduct for the value of the ſeed														7	14	4
Remains nett produce of ſeven acres, in eight years,														153	16	9½

COMMON

COMMON HUSBANDRY.

Years.	A.	Corn ſown.	Co. reaped	Med. Pr. per buſh.	Value of the crop. l.	s.	d.
1	7	Turnips 10 lb.	140 tons	worth	14	0	0
2	7	Barley 2 qrs. 5 b.	28 qrs.	2 s. 8 d.	22	8	0
3	7	Clover 1 lb.	11 load	worth	10	10	0
4	7	Oats 3 qrs. 1 b.	35 qrs.	1 s. 5 d.	19	5	0
5	7	Turnips 10 lb.	140 tons	worth	14	0	0
6	7	Barley 2 qrs. 5 b.	28 qrs.	3 s.	33	12	0
7	7	Clover 1 lb.	11 load	worth	10	10	0
8	7	Oats 3 qrs. 1 b.	35 qrs.	1 s. 8 d.	23	6	8
	56	11 qrs. 4 b. 2 p.	126 qrs.		147	11	8

Deduct for the value of the ſeed 9 l. 10 s. 7 d. and 210 load of dung at 2 s. per load, 21 l.	30	10	7
Remains nett produce of ſeven acres, in eight years,	117	1	1
Drill Huſbandry, total produce of ſeven acres, in eight years	153	16	9½
Common Huſbandry, total produce of ſeven acres, in eight years,	117	1	1
Conſequently the Drill is more advantageous by Proof	36	15	8½
	153	16	9½

" N.B. It is preſumed, that the plough-
" ing expences are nearly equal in each me-
" thod; and therefore there is nothing
" charged here on that account, on either ſide.
" [The expence of ploughing is generally more
" in the Common than in the New Huſban-
" dry: for in the New, the land is once
" ploughed to form the new ridges for wheat
" or other corn, and horſe-hoed four times
" afterwards; not exceeding two common

" ploughings in all. But, in the Old Huſ-
" andry, all the land is uſually ploughed
" three times, often with four horſes; whereas
" two horſes are enough for hoeing, or half
" the number neceſſary for common plough-
" ing.] The value of the ſeed and crop is
" ſet down to each, according to the medium
" prices of corn each year. The above ſeven
" acres of experiment have not been ſelected
" as being particularly ſucceſsful; but only
" as it happened to be the field where they
" were begun, and continued to this time,
" I was thereby enabled to relate the ſeries
" of ſeveral years ſucceſs. The ſoil is light,
" deep, and dry; a hazle mould, excellent
" for barley, but generally thought not of
" ſufficient tenacity for wheat; and worth in
" this neighbourhood fifteen ſhillings per acre,
" tythe-free. The beds extend eaſt and weſt;
" and the field lies gently ſloping to the
" north.

" This field has never been manured, as I
" obſerved before, ſince my experiments were
" begun, nor for many years preceding.—It
" may be remarked, that the firſt crops are
" not the beſt; but, on the contrary, a re-
" gular improvement for ſome years kept pace
" with its cultivation: and the value of
" the four laſt crops is almoſt double to
" the former ones. The greateſt fault com-
" mitted at firſt was, the ſowing too little
" ſeed. The land ſeems yet in perfect heart;

" and

" and though the product of last year was less
" than in former ones, it was well known,
" that the wheat crop failed all over Eng-
" land; as is evident by the present high
" price of that grain. For I cannot allow,
" that the dearness of corn is owing to the
" bounty, as some pretend; having ever con-
" sidered that act of parliament as the Magna
" Charta of English agriculture, and tending
" on the whole to make grain more plentiful
" and cheap.

" Besides the general causes of a scanty
" crop in my field of experiments last year,
" there were particular ones, occasioned by
" my absence in the spring, and great part of
" the summer; whereby the hand-hoeing, a
" very material operation, was neglected, and
" the horse-hoeings not regularly nor duly per-
" formed. I perceived, on my first examin-
" ing the ridges in June last, that the parti-
" tions were full of weeds, and the intervals
" hard and compact; but it was then too late
" to apply an effectual remedy, though the
" weeding and horse-hoeing were, even now,
" of manifest service. The bad condition of
" the beds made me determine not to sow
" wheat again for the next crop, but to give
" the land a thorough ploughing in winter;
" and I prepared it to be sown in spring.
" The aforementioned field is valued at fifteen
" shillings an acre;

	l.	s.	d.
" conſequently the rent of ſe- " ven acres, in eight years, is	42	0	0
" Ploughing expences are, at " moſt, 15 s. per acre, I allow	42	0	0
" For the rent and tillage of ſe- " ven acres, in eight years,	84	0	0
" The total produce of ſeven " acres, in eight years, being " valued at	153	16	9½
" If we deduct for rent and ex- " pences of tillage	84	0	0½
" There remains clear profit, from " ſeven acres, in eight years,	69	16	9½

" which is one pound five ſhillings clear annual " profit, from one acre. And though this " profit be not near ſo conſiderable as I be- " fore computed, from an actual crop of " barley, where the land was in fine order, " and every operation of hand and horſe- " hoeing exactly performed; yet I judge it to " be ſuperior to the old method, and ſuffi- " cient to demonſtrate the advantages of pul- " verization.

" The

	l.	s.	d.
" The total produce of ſeven " acres, in eight years, in the " old method, is	117	1	1
" Deduct for rent and expences, " the ſame as above,	84	0	0
" There remains clear profit on " ſeven acres, in eight years,	33	1	1

" which is not quite twelve ſhillings clear " annul profit from one acre. Though this " clear profit be much leſs than I calculated " before; yet, I apprehend, that there are " many farmers hereabouts who do not clear " more. And, if ſome good managers do " clear twenty ſhillings an acre, which I " hope and believe to be the caſe; I have " ſhewn in my firſt calculation, that the im- " proved Drill Culture is almoſt doubly bene- " ficial: and by my laſt calculation of a " farmer's profit, who is not at the top of " his profeſſion, compared with the actual " produce in a courſe of drilling, where " numberleſs faults were committed during " the five years; the comparative advantage " is as much on the ſide of drilling, as where " I reckoned the produce of each method at " a higher rate; and the proportionable ex-

" cellence

" cellence ſtill remains annexed to the ſyſtem " of Tull."

The culture here given is from Sir Digby's laſt letter to the Society, as he was then become more expert in the New Huſbandry than at firſt; and for this reaſon, as he obſerves, his drilled crops the laſt four years were near double to what they were the firſt four years; and hence it appears, that the impartial compariſon of the two methods ſhould be when both are well executed; and that the firſt four years, " wherein numberleſs faults were com- " mitted," ſhould not be included in the compariſon, as the merits of the Old and New Huſbandry are neither of them to be determined by a few, or ſmall trials, unſkilfully conducted, but by a continued courſe of culture, managed with care, and in the beſt manner: for if the New Huſbandry was ſo much ſuperior, " when numberleſs faults " were committed," the advantage of it over Old Huſbandry, when well performed, is very ſtriking, being near doubly profitable to what Sir Digby has ſtated it.

The land is deſcribed as being light, deep, and dry; yet not ſo much as Mr. Tull's was in general, much of whoſe land was light and dry, but not deep: yet it appears, that his crops of wheat were much greater than Sir Digby's were, even in the laſt years of his practice. One reaſon of this appears to be, that the land here was twice ploughed, to

form

form the new ridges, which is not neceſſary; but is a real injury to the crop, if one of theſe ploughings is reckoned to be as advantageous as a horſe-hoeing, which was the caſe here; for it appears by the deſcription, that this land was horſe-hoed but three times for each crop, viz. firſt, by turning a ſmall furrow from the rows of corn on each ſide; next, by deepening theſe furrows, turning the earth ſtill from the corn; and, laſt of all, ploughing the earth back to the ridges. Now though theſe operations were very uſeful and advantageous to the crop, the land did not receive the full benefit of expoſure, ſo much as it does by four horſe-hoeings, twice from and twice towards the ridges: for theſe ſhould be of a good depth, and a new ſurface is at each hoeing expoſed to the atmoſphere; by which means, the oftener a new ſurface is expoſed to the atmoſphere, at proper intervals of time, the more will the land and crop be improved: but, if time is not allowed for the expoſure, and the earth is immediately ploughed back, without allowing it time to lie expoſed to the air, it will not be improved by ſuch ſecond ploughing, any further than twice ploughing may be an advantage to land, by breaking and pulverizing it more than once ploughing. Whence it happened that this circumſtance was not attended to here, does not appear in Sir Digby's letters; though he was acquainted with the benefits of expoſure,

ſure, as appears from his letter above quoted, where he ſays, "The repeated ſtirrings not "only improve the ſoil by keeping it in a "looſe ſtate, proper to be penetrated by the "roots and fibres of plants, which are thus "enabled to draw their nouriſhment from it: "but they expoſe every particle, in its turn, "to the influence of the atmoſphere; and "procure an inexhauſtible ſupply of food for "the purpoſes of vegetation." This is found to be true from experience: and giving this land but three horſe-hoeings, inſtead of four, appears to be the reaſon that this gentleman thought, that twelve buſhels of wheat on an acre is about the medium quantity to be obtained from moderately fertile ground without dung; whereas we have ſeen, that Mr. Tull obtained a great deal more; and that he, Mr. Dean and Mr. Craik, obtained near as good crops, in the way of drilling and hoeing, as was uſually obtained in the common or broad-caſt Huſbandry.

One cauſe of the drilled crops falling ſo much ſhort of the broad-caſt has been, that the experimenters have depended too much on the fineneſs or pulverization of their land; which is without doubt neceſſary, that the roots may freely penetrate and extend in it; but pulverizing does not of itſelf enrich land: it rather prepares it to be exhauſted, by the roots of plants extending more freely therein; whereas expoſure brings additional riches to

the

the land, and therefore ſhould never be omitted, how fine ſoever the land may be: land finely pulverized is indeed more ſuſceptible of the influences of the atmoſphere, than land that is more cloſe and compreſſed; but no land, however fine, receives ſo much benefit from the atmoſphere, as thoſe parts of it that are expoſed to its immediate action, by being turned and laid open to it, and remaining ſome competent time to be impregnated by it. By not attending to this circumſtance, and ſuppoſing pulverization to be the ſame as expoſure, ſeveral experimenters have been miſled; and ſome have fancied, that the principles of the New Huſbandry were erroneous; whereof we may have occaſion to ſhew another proof hereafter.

The firſt letter from Sir Digby Legard to the patriotic Society of Arts was in 1763, giving an account of his culture of barley in the New Huſbandry, for which they preſented him with a gold medal. He ſpeaks at firſt with great diffidence of this Huſbandry, but, upon further experience, was clearly of opinion, that it was more profitable than the Old Huſbandry; and found it was ſo, though his drilled crops were not ſo large, and were indeed ſmaller, for the reaſons above aſſigned, than ſome other ingenious cultivators have obtained, as we have fully ſhewn.

"I wiſh,

" I wiſh," ſays Sir Digby in his firſt letter, " it were in my power to determine preciſely " the moſt profitable method of culture: but " ſince ſeveral years experience, and the moſt " careful obſervations I have been able to " make, have not been ſufficient to clear up " my own doubts, I ſhall not preſume to dic- " tate to others, or to ſpeak very poſitively " on ſo nice a ſubject. I would reject the " moſt plauſible theory, if unconfirmed by " experiments. And even experiments them- " ſelves, if they are not executed with care, " often varied in different ſoils, ſituations, " and circumſtances, and repeated ſeveral " years, are too apt to miſlead. It is both a " very important and difficult taſk, which " the advocates for the New Huſbandry have " undertaken, to overthrow entirely the old " ſyſtem of fallowing and dung; nay, even " the more modern introduction of turnips " and clover (a ſyſtem which the induſtrious " farmer has long found abundantly ſuffi- " cient, if not to acquire riches, at leaſt to " enable him to maintain his family); in " order to introduce the more faſhionable " ſcheme of pulverization; aſſerting confi- " dently, that nothing more is neceſſary, in " order to create an immenſe and laſting fer- " tility, in almoſt every ſoil, than thorough- " ly to break and divide the earth. But the " aſſertors of a new doctrine are apt to be too " ſanguine. Let us beware of being impoſed

" upon

" upon by novelty; or of preferring inge-
" nious to uſeful diſcoveries. I am the more
" inclined to communicate theſe experiments
" of laſt year; becauſe I think the compari-
" ſon leſs favourable to the New Huſbandry,
" in that than in any other years, wherein I
" have made expetiments. For I would al-
" low every advantage to old cuſtoms, that
" they can naturally or reaſonably claim."
[By this it appears, that Sir Digby was not at firſt, nor for ſome years, inclined to be partial, or even favourable, to the New Huſbandry; upon farther experience, he came to have a more favourable opinion of it, and was at laſt fully convinced of its ſuperiority; which was in conſequence of a long and critical obſervation of the effects of both methods, and this he had opportunity of trying extenſively.]

" Five acres of an incloſed field, the ſoil
" of which is naturally pretty rich, but light
" and dry, inclining to a hazle mould, and
" nearly of an equal goodneſs throughout,
" was deſtined to be ſown with barley, part
" according to the old, and part to the new
" method of Huſbandry, in order to aſcer-
" tain the moſt advantageous method of cul-
" ture. This land had borne four ſucceſſive
" crops, viz. one of barley, two of wheat,
" and one of turnips; was diſpoſed in beds
" [or ridges] from the firſt; and had been
" horſe-hoed every year; but it had never

" had

" had any manure, except that the turnips " had been eaten off by the ſheep. On the " 26th of April, 1753, half an acre was " ſown by hand in the random way, and " took five pecks of ſeed. Half an acre was " drilled in equally diſtant rows, one foot " aſunder, and took three pecks. Two acres " were drilled in ridges or beds, five feet " broad, in double rows, eleven inches aſun- " der, and four feet one inch interval, to be " horſe-hoed, and they took ſix pecks. Two " other acres were drilled, on five feet ridges, " in triple rows, ſeven inches aſunder, and " took four pecks.

" N.B. I feared, at the time of ſowing " theſe laſt two acres, that the ſeed had been " too ſparingly diſpenſed: but the plants " branched ſo much afterwards, that the rows " ſeemed tolerably compleat.

" The above five acres had but one plough- " ing: viz. juſt before ſeed-time, after the " harveſt, 1762. One the 30th of May, " the firſt horſe-hoeing was performed on the " four acres ſowed in ridges, with M. Duha- " mell's one-wheeled plough. But, on ac- " count of the rows being drilled unevenly, " this could not be done very regularly in " ſome places, the plough coming ſo near " the rows as to tear out ſome plants, and co- " ver others with mould; and in others " going at too great a diſtance from the corn. " To remedy this in ſome meaſure, the rows " ſo

" ſo covered had the earth taken off, and an-
" other horſe-hoeing was given on the 7th of
" June, the earth being very dry. By this
" laſt operation, the firſt furrow was cut
" deeper, and the plough went at a proper
" diſtance from the rows." [It is neceſſary to make the ridges and rows of plants to be horſe-hoed, very ſtraight at firſt; and they are frequently not made ſtraight enough by common ploughmen, which, as in this inſtance of Sir Digby's, is inconvenient, and attended with ſome extraordinary expence: this may be prevented, and the ground laid out ſtraight at firſt, by drawing a couple of cart or other wheels upon the ſurface of the level ground, after it is harrowed fine; theſe wheels being connected together by an axle of a proper length, and drawn by one horſe in ſhafts, or a couple of poles, will mark the exact diſtances of the rows, and guide the ploughman to make the ridges equal.] " On the 8th
" of June, all the five acres were hand-hoed;
" but, by reaſon of the dry ſeaſon, not many
" weeds had ſprung up. The effect of the
" horſe-hoeing on the four acres was great,
" and the corn ſeemed to flouriſh exceedingly.
" The plants were of a deep green, and re-
" markably vigorous. The part drilled in
" equally diſtant rows without intervals re-
" mained always of a paler green. But the
" part ſowed in the common way was a de-
" gree ſtill paler, though this laſt part ripened

" the earlieſt, the drilled half-acre next, and " the four horſe-hoed acres laſt of all. The " third and laſt horſe-hoeing was performed " in the beginning of July. This turned the " earth towards the rows, and left a furrow " in the midſt of the intervals.

" On the 31ſt of Auguſt, 1736, the half- " acre ſowed by hand, and the half-acre " drilled in equal diſtant rows, were mowed; " and on the 15th of September, the four " horſe-hoed acres were mowed: the ears of " theſe were far from being equally ripe, be- " cauſe the extreme wet ſeaſon had cauſed ſe- " veral freſh ſhoots at the time the firſt and " principal were ripening. The ſeed was " ſowed too thin on the two acres drilled with " triple rows, and in conſequence there " were ſeveral vacant ſpaces in the rows; and " this was certainly ſome diminution of the " crop. The ears of barley throughout the " four horſe-hoed acres were ſurprizingly " large. Several contained thirty-eight grains " each (which is uncommon, at leaſt, in my " neighbourhood). I believe the number of " grains in an ear were, at a medium, about " thirty.

" The many ſtorms of wind and rain had " lodged the corn in many places. I had " ſome barley this year, ſown by hand, on " freſh and good land, which was ſo lodged " in thoſe places where the land was the " richeſt, and the corn the thickeſt, that the " greateſt

" greateſt part was waſted. Nevertheleſs, " though the horſe-hoed barley inclined every " way, owing to ſtorms, in various direc- " tions, and entirely covered the four inter- " vals ſo that no land could be ſeen; yet " were the ſtalks only bent, but no way in- " jured: and this is one great advantage, " which horſe-hoed corn has over that ſowed " at random. For, though the ears are very " large, the ſtems are proportionably ſtrong " and hard, and being conſtantly expoſed, by " means of the broad intervals, to the in- " fluence of the ſun and air, they acquire " ſuch a degree of firmneſs, as generally to " reſiſt all attacks of wind and rain. The " only inconvenience attending theſe bent " ſtalks was, that they were difficult and " awkward to mow; and, by covering the " intervals, prevented their being ſown, and " deprived me of a good crop of turnips. " For I have generally ſown turnips in the " intervals, immediately after the laſt horſe- " hoeing about the beginning of July. The " land is then reduced to excellent tilth; and no- " thing more is neceſſary than to ſow the ſeed " pretty thick. The firſt ſhower of rain " waſhes it into the ground, and covers it, " without the aid of the harrow. The young " plants enjoy the benefit of the freſh-tilled " earth; and the corn being reaped ſoon af- " terwards, the whole field is left for the tur- " nips to extend their roots in it. I have had

" near as good crops of turnips this way, as " when the land was occupied by that plant " alone.

	qrs.	bush.	p.
" The total nett produce of one " acre of barley, in the Old " method, was,	5	4	2
" Ditto of one acre, ſown in " equally-diſtant rows,	6	0	2
" Ditto of one acre, drilled and " horſe-hoed	3	0	2

" The land of both theſe trials was, as " nearly as poſſible, of equal goodneſs, and " in equal order, lying contiguous in the " ſame field. The ſeed-corn of both was " exactly the ſame, and all ſown on the ſame " day. So that the difference in the produce " of each acre muſt be attributed to the quan- " tity of ſeed ſown, the manner of diſtri- " buting that ſeed in the earth, and the cul- " ture beſtowed on the plants whilſt grow- " ing. It is evident, however, that the land " in the Old produced nearly double to that " which was cultivated in the New way. " But the greateſt produce was from the land " ſown with the drill-plough in equally-diſ- " tant rows, one foot aſunder. Yet are we " not from thence to determine too raſhly in " favour of either method.

" I own,

" I own, from the appearance of the crop " whilſt growing, and even after it was " reaped, I did expect that the quantity from " the four horſe-hoed acres would have been " more conſiderable. Indeed I can account " for ſome diminution of the crop from the " following accidents, viz. the horſe-hoed " corn ripened unequally, owing, as was be- " fore obſerved, to the exceſſive wet ſeaſon; " and, as it was later reaped than the other, " it was more expoſed to the depredation of " ſparrows and other birds, which certainly " got part of it. And, being firſt carried " into a Dutch barn, and removed ſome time " afterwards into a common barn to be " threſhed, there was not only a loſs by ſcat- " tered ſeed in the removal, but likewiſe by " pigeons, which devoured a good part, " having a conſtant and free acceſs to the " tops and ſides of the barn where it was firſt " depoſited. Whereas the produce of the " parts cultivated in the Old way, and drilled " in equally-diſtant rows, was carried into " the barn, and threſhed immediately, and " therefore not liable to the ravages of ver- " min, or to any other loſs.

" But it muſt be allowed notwithſtanding, " from this experiment, that the advantage " appears to be on the ſide of the Old me- " thod. On the other hand, although ſix " quarters on an acre is confeſſedly a very " large increaſe from land ſown in the common

" manner, yet it is no leſs true, that this " great fertility was, in a conſiderable mea- " ſure, owing to the excellent culture be- " ſtowed on it by the horſe-hoeing method. " Conſtant tillage, during the four preceding " ſummers, had undoubtedly ſupplied the " place of manure: and four ſucceeding crops, " which were none of them bad, were ſo far " from having exhauſted the earth, that there " ſeemed to be an increaſe of vegetable food. " The ſoil appeared ſo thoroughly divided, " that, ſince the harveſt of 1763, the above " four acres have been drilled with wheat at " once ploughing, and promiſe a good crop, " the ridges being now where the furrows " were laſt year: but thoſe parts which " were ſown at random, and in rows, have " been manured at the rate of ſixteen loads of " ſtable dung to one acre, in order to recover " their loſt fertility: and it was neceſſary to " ſow ſome kind of meliorating crop, to " make this part of equal goodneſs with the " reſt of the field. It has accordingly been " ploughed into five-feet ridges, and drilled " this April with white peaſe, a double row " on each bed, and is intended to be horſe- " hoed.

" I cannot help obſerving here, that were " I to follow M. De Chateauvieux' method " (although, in moſt inſtances, I am proud " to follow the example of ſo able an expe- " rimenter), and compute the produce of ſe-

" veral

" veral years on the footing of the above
" horſe-hoed crop, reckoning the land in
" the Old way to bring a crop only once in
" two years, the advantage would be greatly
" in favour of the New method, even ſup-
" poſing every crop in the old at the rate of
" ſix quarters to an acre. For the expence of
" manure and tillage, in the fallow year, are
" infinitely greater than the horſe-hoeing ex-
" pences. But, if England be ſo much ſu-
" perior to Swiſſerland in goodneſs of ſoil;
" or, if our farmers are ſo much more ſkilful
" than theirs, that we can in the common
" management, I mean, by the culture of
" turnips, clover, rape, &c. have a benefi-
" cial crop every year; I ſhould be inclined
" to doubt, whether the very ſuperior advan-
" tages, which ſome writers attribute to the
" horſe-hoeing Huſbandry, may not be more
" imaginary than real. Not but that I
" think there are ſeveral circumſtances to re-
" commend it, and that it may be followed
" in ſome ſituations to great advantage. As
" where the difficulty of procuring manure is
" very great, or where the diſtance of the
" ploughed field from the farmer's habita-
" tion would make the carriage too expen-
" ſive. There are alſo ſome ſoils more pecu-
" liarly adapted than others to the New
" Huſbandry, as requiring an extraordinary
" degree of pulverization; ſome vegetables

" are particularly improved by beſtowing a " culture on them whilſt growing.

" I ſhould therefore be concerned to find, " that any one was deterred, by what I have " ſaid from making or continuing their experi- " ments in the New Huſbandry. My expe- " rience is much too ſmall to determine ab- " ſolutely the comparative excellency of the " two methods. I have, however, ſo good an " opinion of Mr. Tull's ſyſtem, that I have al- " ready continued the practice of it for five or " ſix years, and have tried it on ſeveral kinds " of vegetables; and in a pretty extenſive " manner. I propoſe to continue my experi- " ments, to extend, and to vary them. Per- " haps, at laſt, I may be able to aſcertain, " whether or no the horſe-hoeing ſcheme be " ſuperior, and in what degree." [This gentleman has hitherto ſpoken like an impartial experimenter, with caution and diffidence; but, after continuing, extending, and varying his experiments for a courſe of years, and finding the New Huſbandry ſtill ſuperior, he fully declares himſelf convinced of it; though, on account of his hoeing his barley, and alſo his wheat, but three times in the ſeaſon, his ploughing ſhallow at firſt, and giving his partitions between the rows of wheat but one hand-hoeing, his crops of horſe-hoed wheat were inferior to what they would have been, had he beſtowed a more perfect culture upon them; which evidently appears from what we have

ſhewn

ſhewn above, that ſome eminent cultivators obtained much larger crops, from land of inferior quality, or not ſo well adapted to the hoeing huſbandry. To this alſo may be added, that Sir Digby's crops were late in ripening, which is attended with ſeveral inconveniences, and may in ſome meaſure be prevented by early ſowing. Hoed crops are longer in ripening than thoſe not hoed; as the hoeing continues to furniſh them longer with nouriſhment, whereby the plants, and ſeed, are brought to greater perfection: It is therefore the intereſt of the cultivator, to haſten the blowing of the plants, and to protract their ripening; early ſowing is a means of obtaining both theſe advantages.]

"There is one prejudice," continues this gentleman, "commonly adopted againſt this "method by the inexperienced, *viz.* that it "is very expenſive; which is entirely ground-"leſs, as will appear by attending to the fol-"lowing particulars. The two-wheeled drill "plough, invented by Mr. Tull (which I can-"recommend as a good inſtrument, having "had ſeveral years experience of it, and ſome "hundreds of acres drilled with ſucceſs), may "be made compleat, with wooden ſeed-boxes, "for fifty ſhillings. Mr. Duhamel's one-"wheeled plough, for horſe hoeing, coſts "thirty ſhillings. But this laſt, though very "uſeful, is not abſolutely neceſſary. For the "common plough without wheels will per-

"form

" form all the operations of horſe-hoeing ;" [and much better than any plough that has a wheel; which, as it goes upon the ſide of a ſloping ridge, is apt to draw the plough too much to the right.] " Thoſe two inſtru-" ments may be eaſily made, and repaired, by " a country wheelwright. I have ſeveral " made in the village where I live, at the " aforeſaid prices, which were very perfect, " and have laſted ſeveral years. It is true, I " make uſe of ſome other inſtruments, which " may be ſaid to be appendages of the New " Huſbandry, as they have been contrived by " the practitioners of it. But the five-coul-" tered plough, the ſingle and double-culti-" vators, &c. though extremely convenient to " thoſe who practiſe this method in a very " extenſive manner, are by no means neceſ-" ſary in making trials, or ſmall experiments." [Theſe two cultivators are the invention of M. De Chateauvieux; and may be uſeful in ſome particular caſes, but are by no means proper to be ſubſtituted for the hoe-plough; as we ſhall have occaſion to ſhew, in treating of Mr. Wynn Baker's experiments upon wheat.]

" After the firſt year, that is, when the " land is reduced to fine order, one horſe is " generally ſufficient to turn a furrow either " to or from the rows: and as a man and " horſe can, with eaſe, horſe-hoe four acres " in a day, it cannot coſt more than one ſhil-

" ling

" ling to horſe-hoe an acre, even including " the repairs of the inſtruments. Nor are " more than four hoeings commonly required. " So if we reckon four ſhillings for ploughing " the ground once over, or forming freſh " ridges; four ſhillings more for horſe-hoe- " ing; two ſhillings and ſix-pence for hand- " hoeing; two ſhillings for weeding; and " ſix-pence for drilling; thirteen ſhillings is " the whole expence of managing an acre in " the new method.

" Such therefore being the caſe with " which this celebrated method is performed, " ſo great the improvement of the land by it, " and ſuch the extraordinary effects produced " by merely ſtirring the earth; one would " think every huſbandman ſhould be induced " to give it a fair and candid trial; and as " there needs not the exaggerated encomiums, " which its partizans have affected to beſtow " upon it, on the one hand; ſo, on the other, " the inveterate prejudices, which prevail in " many againſt this ſyſtem, as they have no " foundation in truth, muſt prove ſubverſive " of the intereſts of agriculture."

Sir Digby's next letter is dated the 1ſt of November 1765.—" The experiments," ſays he, " that I had the honour to lay before you, " in 1763, in order to determine the moſt " beneficial method of cultivating barley, were " I fear, not entirely ſatisfactory; at leaſt they " were not ſo to me; I muſt beg leave therefore,

" to

" to add the following, as a ſupplement to my
" former letter.

" However doubtfully I might expreſs my-
" ſelf, in that letter, with regard to the ex-
" cellence of the drill, and horſe-hoeing cul-
" ture, (not having, as I thought at that time,
" ſufficient experience to determine a point
" of ſo much importance) two years careful
" obſervations have ſince enabled me to ſpeak
" more poſitively, and have made me incline
" much more to the ſide of the drill ſyſtem.
" Nor have my experiments been confined to
" barley. I have cultivated wheat for ſeveral
" years with ſucceſs, and have applied the
" horſe-hoeing huſbandry to beans, peaſe,
" oats, turnips, potatoes, ſainfoin, and lucern;
" and the effects of horſe-hoeing have been
" ſo conſtant and uniform in the cultivation
" of all thoſe vegetables, that I have no doubt
" but that this method, if executed with care,
" attention, and perſeverance, during a term
" of years, will prove much more advan-
" tageous than the old method.

" The ſame field in which the experiments
" on barley were made (as before related in
" 1763) is now ſown with wheat, the eighth
" ſucceſſive crop, of which four crops have
" been wheat. The two laſt of theſe have each
" produced two quarters of wheat per acre; and
" the land is ſo far from being exhauſted by
" ſo many burdens, that it ſeems yet in per-
" fect heart, though no manure has ever been
" laid upon it.

" I have now practiſed the drill culture " about eight years, and, from the moſt care- " ful obſervations I have been able to make, " I judge, that twelve buſhels of wheat on " an acre is about the medium quantity to be " obtained, from moderately fertile ground, " during at leaſt ſix ſucceſſive years, without " dung. I reckon eight buſhels to the quarter, " and nine gallons to the buſhel. Now if this " be a true poſition, I think it will not be " difficult to prove, that the drill culture is " more beneficial to the farmer than any " other method hitherto invented."

If Sir Digby's twelve buſhels of wheat per acre were more profitable than the Old Huſbandry, how much greater was Mr. Tull's, who had nearly twenty buſhels (alſo nine-gallon meaſure) upon the acre in double rows alſo, from about ninety acres of his worſt land; and his land poorer and much ſhallower than Sir Digby's? This ſhews plainly, that there was a defect in Sir Digby's tillage, and that his land, inſtead of three, ſhould have had at leaſt four horſe-hoeings, deep hoeings from the rows of wheat, and cloſe to them.—And Mr. Craik ſays, " Were it not for the parts that fail in my " fields, my horſe-hoed crops would exceed " four quarters;" that is, his crops would exceed four quarters Wincheſter meaſure, upon the Scotch acre; which is twenty-five and a half Wincheſter buſhels, upon an Engliſh ſtatute acre.]

After

" After I have related the two laſt years ex-
" periments on barley, I ſhall give a compara-
" tive view, of the expences and profits attend-
" ing the cultivation of the land, in the old and
" new way; and I ſhall calculate the profit in
" the old way, not according to the management
" in uſe in the time of our anceſtors, but accord-
" ing to the beſt modern improvements, taking
" the account from ſome celebrated modern
" practitioners, as related by themſelves.

" A compariſon of this ſort is not ſo properly
" made betwixt the Old and New Huſbandry,
" as betwixt the modern improvements adopt-
" ed by the common farmer, and the benefit
" peculiarly ariſing from the drill and horſe-hoe-
" ing ſyſtem. That the latter is founded on juſt
" principles, I am convinced; and that the
" practice of it (if any credit be due to the ac-
" tual experiments of its profeſſors) ought to be
" eſteemed one of the moſt conſiderable im-
" provments in agriculture.

" On the 26th of April 1764, two acres and
" a half were drilled with barley on ridges
" four feet and a half broad, viz. a double row
" ten inches diſtant on the top of every ridge,
" the intervals for horſe-hoeing three feet eight
" inches broad; and took two buſhels two
" pecks of ſeed. One acre adjoining, and of
" equal goodneſs, was on the ſame day drilled
" with barley, in equally diſtant rows, one foot
" aſunder, and took two buſhels of ſeed. One
" other contiguous acre was, at the ſame time,

" ſown

" ſown in the broad-caſt manner, and took two
" buſhels one peck of ſeed. All the land was as
" near as poſſible of equal goodneſs, of a light
" and dry nature; viz. a good hazle loam,
" worth fifteen ſhillings per acre. This field had
" borne a good crop of oats, viz. ſix quarters per
" acre, the preceding year, on once ploughing.

" N. B. It had been twenty years in graſs.

" Two ploughings had been performed ſince
" the oat crop, viz. one in the autumn, and
" the other in the ſpring. The horſe-hoed part
" had three hoeings given at proper times, and
" was once hand-hoed. The one acre drilled
" level could not be hand-hoed, becauſe fain-
" foin had been ſown in the partitions, betwixt
" the rows of corn; and it is to be obſerved, the
" want of this hand-hoeing deprived the barley
" of a very material advantage. The acre ſown
" broad-caſt was alſo laid down with ſainfoin,
" and was not weeded.

" The horſe-hoed corn, as well as the level-
" drilled, and broad-caſt, were cut on the 18th
" of September, and produced,

	qrs.	buſh.	p.
" The two acres and a half horſe-hoed, when threſhed,	10	5	0.
" The produce of one acre drilled in equally-diſtant rows,	4	4	0
" And of the one acre ſown broad-caſt,	4	2	1

" The

" The horſe-hoed crop may be eſteemed a " great one, as it produced four quarters and " three buſhels to an acre. The corn was alſo " ſuperior in ſize and goodneſs to the other; " and was ſold immediately for one pound five " ſhillings per quarter; ſome ears contained " thirty-eight grains. This crop ſuffered a " diminution from ſome horſes breaking into " the field, and eating ſeveral rows, juſt at the " time of its getting into ear. But as the two " other acres of experiment were injured by the " corn being lodged, in ſome places, by ſtorms " of wind and rain, theſe accidents might " nearly balance each other.

" On the 4th of May 1765, the two acres " and a half, juſt mentioned to have been horſe- " hoed the preceding year, were again drilled " with barley, after two ploughings, to form " the ridges, and took two buſhels one peck " of ſeed. Theſe were horſe-hoed, and hand- " hoed; and, in ſhort, managed in every reſpect " as in the former year. This crop was reaped " on the 13th of September, and threſhed the " 22d of October. The produce was ten quar- " ters of fine and clear corn, ſold at one pound " two ſhillings and ſix-pence per quarter. The " adjoining land, where the laſt years experi- " ments were made, could not be ſown this " year with corn, by reaſon of its being occu- " pied by a crop of ſainfoin; which now looks " very promiſing. But I obſerve, that this year " my crops of barley in general do not produce

" more

" more than four quarters four buſhels per
" acre. But taking my barley crops at a me-
" dium for the laſt three years, the produce
" has been four quarters on an acre, in my
" beſt fields, ſown broad-caſt; and taking the
" horſe-hoed crops at a medium for the beſt
" three years, the produce has been three quar-
" ters ſix buſhels and three pecks. In the fol-
" lowing compariſon therefore I ſhall calcu-
" late each year's crops, both in the old and
" new way, on the above footing.

" It is impoſſible to be very exact in this
" kind of calculations; but I ſincerely believe,
" that there is greater probability of reaping
" four quarters on an acre in the horſe-hoeing
" huſbandry, than five quarters in the com-
" mon way, on ſuch a ſoil as I have made
" my experiments on. It has been uſual to
" reckon, that the farmer ought to make three
" rents of his land: one third of which goes
" to his landlord, another to the expences of
" cultivation, and the remaining third to the
" maintenance of himſelf and family. But we
" will allow that the art of huſbandry is ſo
" much improved, that an intelligent farmer
" may receive above a third clear profit. One
" cannot preciſely determine what the profit
" is, which varies probably in every county,
" and depends ſo much on circumſtances and
" ſituation. I ſhall therefore ſet down a courſe
" of huſbandry frequently obſerved by farmers
" in my neighbourhood, where the fields are

" incloſed, and let for fifteen ſhillings an acre " tithe-free.

An eſtimate of the expences and profit of one acre, in four years.

	l.	s.	d.
" For turnips firſt year, four " ploughings, at 4 s. each,	0	16	0
" Harrowing and ſeed, 2 s. hoe- " ing 6 s. rent 15 s.	1	3	0
" Fifteen loads of dung, at " 2 s. 6 d. per load,	1	17	6
" Expences	3	16	6
" The firſt year's produce of tur- " nips, worth	2	0	0
" The ſecond year barley, pro- " duce 4 qrs. at 18 s. per qr.	3	12	0
" Two ploughings and harrow- " ings 10 s. three buſhels ſeed " and weeding, 8 s. and rent " 15 s.	1	13	0
" The third year clover, 14 lb. " ſeed, and rent	0	19	0
" Two crops of clover, worth	1	10	0

" Fourth

	l.	s.	d.
" Fourth year wheat, 3 qrs. at " 1 l. 16 s. per qr.	5	8	0
" One ploughing and harrowing 7 s. three bushels seed " and weeding 16 s. and rent " 15 s.	1	18	0
" Total produce of an acre, in " four years,	12	10	0
" Total expence of an acre, in " four years,	8	6	6
" Clear profit in four years	4	3	6

" I have not computed the value of the straw, " becauſe it is ſuppoſed, that the expences of " reaping, threſhing, and carrying to mar- " ket, will be nearly equivalent in this " neighbourhood. In other places, where the " value of ſtraw may be thought greater or leſs " than the expences, the calculation may be " made accordingly.

" NEW METHOD.

	l.	s.	d
" Three quarters six bushels and two pecks of barley, on an acre, at 18 s. per quarter, is worth	3	8	7½
" Deduct for expences, viz. two ploughings, 8 s. three horse-hoeings, 3 s. hand-hoeing, 2 s. 6 d. seed, 2 s. 1 d. ½, rent 15 s.	1	10	7½
" Remains clear profit in one year	1	18	0
" Consequently the clear profit on one acre in four years, is	7	12	0

" It appears from the above estimates, that " the profit is considerably greater in the drill, " than in the Old Husbandry; yet I have " supposed the fourth crop in the old way to " be wheat. Whereas it is much more com- " mon hereabouts, where the land is not " perfectly adapted to the culture of wheat, " for the farmer to sow oats, or some other " spring crop, after the clover; and thus is " the profit reduced. But I proceed to the " calculation of others.

" A

" A letter in the third volume of the *Mu-*
" *ſeum Ruſticum*, page 332, ſigned Y, reckons
" the clear profit of land in tillage near Bury
" at about fifteen ſhillings per acre. According
" to my calculation, as above, the clear an-
" nual profit is one pound one ſhilling, in my
" neighbourhood, in the old way. But a
" very ingenious treatiſe, in the fifth number,
" in the Foreign Eſſays on Huſbandry, page
" 322, recommending the culture of ſainfoin
" and clover, with intermediate crops of corn,
" written by M. De L'Harpe, eſtimates the
" clear profit of one acre at one pound ſeven-
" teen ſhillings. Therefore, as his method
" ſeems a very good one (though it is cer-
" tainly the higheſt calculation of any I ever
" met with), I ſhall compare the clear profit
" to be expected in the drill culture with his
" calculation.

	l.	s.	d.
" Monſ. De L'Harpe reckons " the annual produce of ſixty " acres to be worth	170	0	0
" From which he deducts for " expences ten ſhillings per " acre, and rent ten ſhillings " per acre	60	0	0
" Clear annual profit on 69 acres	110	0	0

	l.	s.	d.
" Drill culture 3 qrs. 6 buſh. 2 p. " of barley, at 18 s. per " acre, and for 60 acres	205	17	6
" Deduct for rent, 45 l. and for " expences the ſame	90	0	0
" Clear annual profit out of 60 " acres	115	17	6

" Hence it appears, that ſixty acres in the " drill culture is more advantageous than the " higheſt calculation of profit made by mo- " dern improvers. But this is not all. For " the above is calculated from a horſe-hoed " crop of barley; whereas, in many ſoils, I " am convinced, it is more profitable to cul- " tivate wheat in that manner. I have had " ſeven ſucceſſive crops from the ſame land " without manure, and the ſoil is yet unim- " poveriſhed, and ſown at preſent with wheat, " the eighth crop.

	l.	s.	d.
" I have had ſometimes two " quarters of wheat on an " acre,	3	12	0
" Whereas I eſtimate the crop " of barley at no more than	3	8	7½
" But the clear profit from one " acre of drilled wheat may " be	2	0	0

" Thus

" Thus have I, with candour, endeavoured " to give a clear and comparative view of the " Old and New Huſbandry. During the " eight years that I have practiſed the latter, " I have been careful to obſerve the peculiar " advantages and defects of each method: " and if, upon the whole, I at laſt declare in " favour of Mr. Tull's ſyſtem, it is with- " out prejudice, and merely from conviction.

" That the old method, with the aſſiſtance " of the more modern improvements by tur- " nips and clover, and by the alternate uſe " of the leguminous plants, which require " hand-hoeing, is very advantageous, I allow. " Perhaps the farmer, who purſues this me- " thod in its greateſt perfection, judges wiſely " in preferring a ſyſtem he is maſter of, and " can confide in, to another whoſe principles " may be juſt, but the practice of which is " totally different from his own. But the " farmer, who is ignorant of theſe modern " improvements, ſurely ought not to heſitate " to adopt the drill culture, which a few years " practice would render habitual, and which " he would find to be much more beneficial. " For it is certain, that this is leſs expenſive " than the old method; and, when once " adopted, eaſier in the execution."

Sir Digby then proceeds to relate his practice in cultivating wheat according to the New Huſbandry, and recommending it without reſerve as much ſuperior to the Old. I have

inſiſted more minutely upon his firſt experiments than at firſt intended, in order to give the reader a full view of this gentleman's practice, and the judicious remarks he makes, on a comparative view of both the Old and New methods. It is, however to be regretted, that he did not more perfectly follow the New, as laid down by the author of it, by doing which his drilled crops would have been larger, and the ſuperiority of the New Huſbandry would have been ſtill more apparent. This gentleman deſcribes his land to be "light, deep, and dry, a hazle mould, excellent for barley; but generally thought "not of ſufficient tenacity for wheat." This was the opinion of the common farmers, and they were probably right: but they judged from their ideas of the Old Huſbandry, which cannot be ſafely made the ſtandard for the New. This land was prepared by ſeveral ploughings in the Old Huſbandry, previous to ſowing it with wheat, and, if it happened to be a dry ſummer, the wheat ſuffered for want of moiſture; but, in the New Huſbandry, this could not happen, if the land was well and deep-hoed; becauſe, when the days are dry, there are generally plentiful dews in the night; and theſe dews penetrate into land as deep as the plough goes. This is found in all land tilled deep for madder, or other ſuch crops; they produce great crops of wheat, after the madder, &c. is carried off, being moiſtened

moiſtened by the dews to a great depth, and by theſe the land is inriched: for no manure is laid upon theſe deep-ploughed lands for wheat or other corn. Mr. Tull's land was all of it light land, ſhallow, and very dry, except one field. "I am ſorry," ſays he, p. 65, "that this farm, whereon I have only practiſed "horſe-hoeing, being ſituate upon a hill, that "conſiſts of chalk on one ſide, and heath-"ground on the other, has been uſually "noted for the pooreſt and ſhalloweſt ſoil in "the neighbourhood" And p. 263. "My "farm was termed a Barley-farm, not from "the good crops of barley it produced, but "becauſe the land, being almoſt all hilly, "was thought too light for wheat; for in "their old management it was often de-"ſtroyed by poppies and other weeds, and "ſeldom was there a tolerable crop of wheat. "In a dry ſummer, the barley crop failed for "want of moiſture, and of more pulveri-"zation, and was not worth half the expence. "Land is ſeldom too dry for wheat, and this "dry ſoil, in the hoeing culture, brings very "good crops of wheat; which is the reaſon I "have now no barley, except what is ſown "upon the level, as it always muſt be for "planting ſainfoin and clover amongſt it; "were it not for that purpoſe, I ſhould plant "no barley at all." Hence it appears, that Mr. Tull's land was both very dry and ſhallow; yet he planted it all with wheat, and horſe-

horſe-hoed it. Alſo it appears, that he had good crops of wheat, as appears from the account of his crops given above, much ſuperior to Sir Digby's wheat crops, though his was deep land. Mr. Tull alſo horſe-hoed his wheat four times, and deep; whereas Sir Digby's was horſe-hoed only three times. He ſays indeed (as before-mentioned), "nor "are more than four hoeings *commonly* re- "quired; ſo that, if we reckon four ſhillings "for ploughing the ground once over, or "forming freſh ridges, four ſhillings more "for horſe-hoeing, two ſhillings and ſix- "pence for hand-hoeing, two ſhillings for "weeding, and ſix-pence for drilling; thir- "teen ſhillings is the whole expence of ma- "naging an acre in the New method." But though four horſe-hoeings are charged here, as generally neceſſary for a crop of wheat, yet this land was horſe-hoed but three times (for what reaſon does not appear), and theſe horſe-hoeings were performed with only one horſe; which, as the land was deep, might have been deeper ploughed with two horſes; this would have kept the land moiſt to a good depth, would have enriched it more, and cauſed it to produce much greater crops.

Having given ſo full an account of this gentleman's barley and wheat crops, I ſhall be the ſhorter with reſpect to the other horſe-hoed crops. The ninth crop upon the ſeven acres was in the year 1767, ſix acres lentils,

and

and one potatoes, in order to deſtroy the weeds, which by neglect greatly abounded; but the ſeaſon continued ſo long rainy, that the lentils ſprouted, and the crop became mouldy when houſed, and was of little value; and the acre of potatoes was alſo an inferior crop; theſe deficiencies were not, however, owing to the New Huſbandry, but to an uncommon bad ſeaſon.

	l.	s.	d.
The loſs is reckoned at	4	8	0
Yet including this loſs, there remained a clear profit of	28	4	0
The profit from theſe ſeven acres in nine years was	65	9	0.

which is an advantage of more than 28l. over the Old Huſbandry: and "it is very probable," ſays Sir Digby, "that when the "preſent wheat crop, now growing, and in "a flouriſhing condition, ſhall be added to "the account, the excellence of the Horſe-"hoeing Huſbandry will be more evident.

"That part where the potatoes grew makes "the beſt appearance at preſent; and there-"fore I can particularly recommend this "plant, as an excellent preparative for wheat. "—Of the other excluſive benefits attending "the potatoe culture, I can give the follow-"ing inſtance. October 31ſt, 1765, an acre "of potatoes, planted in a rich dry ſoil, pro-

"duced

" duced thirty-ſix quarters; which, at three " pence per peck (a very low price), were " 14 l. 8 s. Another acre the preceding year " was planted with potatoes on five-feet " ridges, viz. a ſingle row on every ridge, " and each plant a foot diſtant. Theſe were " well weeded and horſe-hoed, and the crop " was thirty-ſeven quarters five buſhels, " which, at three pence per peck, comes to " 15 l. 4 s. But here the land was very rich. " —Though can there well be a more profit- " able culture?

" I have had very great crops of ſainfoin- " ſeed this way; and once, in particular, I " meaſured a ſingle row on a three-feet ridge, " and one hundred yards in length produced " five pecks; and conſequently an acre would " yield ſeven quarters four buſhels, an aſto- " niſhing quantity! But the rows were per- " fectly weeded, and the ſeed gathered by " hand, ſo that ſcarce a grain was loſt; " whereas, in the common way of mowing " and threſhing, there is generally immenſe " waſte, probably amounting to half the " quantity. But, on the other hand, the " expence of gathering the ſeed of one acre, " by women, calculated from the row above- " mentioned, would amount to three pounds."

But, if the tops were cut off with a reap-hook, and in the dew, it will not be liable to ſhed; and the ſeed may be ſaved this way at a ſmall expence.—Sir Digby ſeems to incline to

the

the opinion of many farmers, that the ſtalks of large ſainfoin are hard and pipey, and for that reaſon not ſo agreeable to cattle, as the ſmall leafy ſort: but this is becauſe they are apt to let it grow too old before they cut it; as they are in regard to broad clover alſo, and other graſſes. But large ſainfoin is the richeſt and moſt juicy, if cut before it bloſſoms; which for hay, or to be fed green, it ſhould always be, before any of the bloſſoms appear. And lucerne ſhould be cut ſtill earlier, viz. not only before any bloſſoms appear, but even before the bloſſom-buds are formed. In this there is no loſs; for the earlier theſe plants are cut, the ſucceeding crop grows the quicker.]

" I own, I have ſeldom found that horſes " leave any, not even the groſſeſt part of " the ſainfoin plant. They will eat the ſtalks, " where the ſeed has ripened. Sheep are " more delicate: for, though they are exceſ- " ſive fond of ſainfoin both in graſs and " hay, you may frequently ſee the thickeſt " of the ſtems left untouched, where they " have been foddered." [But give them ſainfoin in graſs or hay, that is cut before it bloſſoms, they will eat the largeſt ſtalks clean up, and make no waſte.]

" Though I do not altogether approve of " drilling ſainfoin, to be horſe-hoed, I prefer " the drilling of it in equally diſtant rows to " ſowing it by hand. Becauſe the drill ſows

" more

" more regularly than the hand; and you " ſave half the quantity of ſeed. I am ſure, " I have not leſs than one hundred acres of " drilled ſainfoin. Some of it in rows at one " foot, and the reſt at half a foot diſtance. " The greateſt quantity I ever ſow is three " buſhels to an acre. The leaſt, and which " I generally ſow, is one buſhel and an " half to an acre. I have many fields, where " the plants are quite regular, and ſtand " as thick as one would wiſh, producing very " good crops.

" I have ſeveral thouſand acres on the " wolds, that do not let for a ſhilling each " acre. The ſoil is generally dry, ſhallow, " and ſtoney. This, after being reduced to " fine tilth, by repeated ploughings, and " nanured by the fold of a large flock of " ſheep, which I keep for that purpoſe, has " been gradually and ſucceſſively laid down " with all the various kinds of graſs-ſeeds in " common uſe; the principal of theſe are " ſainfoin, and all the clovers, burnet, tre- " foils, lucerne, rye-graſs, rib-graſs, and com- " mon hay-ſeeds; of all theſe, ſainfoin has " made the moſt general and greateſt im- " provement. This plant, whilſt grow- " ing, is grateful to all kinds of cattle; " and the hay is excellent. The produce " from this land is, in a good year, about a " ton to an acre, taking the whole crop of a " large field together. It is true, I have had

" three

" three ton to an acre in rich land. But one " ton from ſuch poor land appears to be " a more extraordinary produce: and beſides, " the hay is finer, ſweeter, and more nou- " riſhing than from the former. [This pro- bably, becauſe the ſainfoin from the poor land was cut earlier than the other: for other- wiſe, and the hay equally well-made, the rich land produces the beſt hay.]

" As to lucerne, I could never get it to " ſucced on ſuch a ſoil; but muſt now do juſ- " tice to its merit: for I have cultivated it " with ſucceſs in a rich, deep, and dry ſoil. " I have about two acres in beds, of three and " four feet breadth, in ſingle and double " rows, part tranſplanted, and part ſown, " which I keep carefully weeded, and which " yields me generally three, and ſometimes " four, crops in a ſummer. The firſt crop " is now (the 13th of May) ready to cut, " being a foot and half high." [By this ac- count, it ſeems, that Sir Digby's lucerne was very imperfectly and very ſhallow hoed; for, on ſuch land as this, rich, deep, and dry, if well horſe-hoed, it is ready to cut earlier than the 13th of May in many parts of England; and riſes much higher than a foot and a half, and even to twice that height, frequently higher. The quality of this lucerne ſhews alſo, that it was poor: for Sir Digby ſays] " I find it a very " great ſaving of corn. I give it to my coach " and ſaddle-horſes regularly every day, freſh as " it

" it is cut: and I think it, in ſome meaſure, " ſupplies the place of oats. I have fre- " quently fed ſome of my horſes with half " lucerne, and half their uſual allowance of " corn, and found that thoſe horſes were in " higher fleſh and ſpirits than the others, " which had their uſual food, viz. hay and " corn." [But there are many inſtances, that horſes, fed with good lucerne, require no hay or corn, though hard-worked.] " Either in " ſingle or double rows, with three or four " feet intervals, tranſplanted or ſown, it may " do extremely well, provided you weed care- " fully; but that is eſſential. With ſuch " care and expence, often repeated, viz. three " times a year, you may have good lucerne " on almoſt any ſoil; and, without it, the " moſt proper ſoil in the world will not ſup- " port lucerne above a year or two."

Sir Digby concludes, as before-mentioned, with a full approbation of the Horſe-hoeing Huſbandry in preference to the Common; and his ſucceſs would have been ſtill greater, had he employed two horſes to hoe his deep land, and given it at leaſt four horſe-hoeings with two horſes, inſtead of three only with but but one horſe. This was the leaſt given, or directed, for wheat by the author of this Huſbandry; and none have yet excelled him in the practice of it.

In 1763 the rev. Mr. Lowther communicated to the London Society of Arts his experiments

periments in the Drill Culture of wheat in Cumberland, compared with the common courſe of crops in that country, viz. the firſt year turnips, with the full quantity of manure; the ſecond year fallow; and the third year a crop of wheat, without manure. This courſe continued every three years. In the Drill Culture, the firſt year turnips, with half the quantity of manure, as the broad-caſt; the ſecond year, barley; and the third year, wheat. The barley and wheat repeated the fourth and fifth years, and then the manuring and turnips to take place again. It does not appear, that any manure was uſed for the crops of corn. The land, on which the experiments were made, was a heavy, moiſt ſoil, with a clavey bottom, and deemed too ſtiff for barley. It was tilled out of hay, and had borne a crop of oats. The rent eight ſhillings per acre.

The courſe of crops here mentioned is an uncommon one, and by no means the beſt. Mr. Lowther drilled three rows of wheat on each ridge, which were too many, and his ridges were but five feet and a half broad, which for three rows ſhould have been ſix feet; upon the whole, he reckons the drilled crops were more profitable than the broad-caſt in that country, by eight ſhillings two pence and eight-fifteenths per acre; but theſe experiments were not ſo ſatisfactory by much as thoſe made by Sir Digby Legard: and

therefore it is not neceſſary to relate them more particularly.

Mr. Doſſie has likewiſe particularly related the experiments made by Mr. Cox of Wallhampton, near Lymington in Hampſhire, in a field of twenty-three acres, divided into ſixteen parts, and drilled on the level, ſome parts with red, and others with white wheat, the rows one foot aſunder, and hand-hoed; ſome were manured with lime, and the other parts not manured. The above parts produced conſiderably more than the common broad-caſt ſown wheat in that country. The land of this field was nearly of the ſame quality, viz. a ſhallow mould on a gravel. The quantity of ſeed drilled was one buſhel per acre. The quantity uſually ſown there broad-caſt is from two to two buſhels and a half per acre. And, as Mr. Doſſie obſerves, that at the rate at which wheat is now ſold (in 1767), there is a clear ſaving, in the drill method of ſowing, of near the rent of the land, viz. twelve ſhillings and ſix-pence per acre. This is, reckoning the produce of all the experiments at an average, and after deducting for the hand-hoeing, and all other expences; and is a full proof, that drilling on the level, in rows a foot diſtant, and hand-hoed, is more profitable than the common broad-caſt ſowing; but drilling the wheat upon ridges, and horſe-hoeing it in the proper manner, is ſtill much more profitable than level drilling and hand-

hoeing, or than any other way hitherto practiſed of cultivating wheat.

Mr. Doſſie concludes this head with a quotation from Mr. Wynne Baker, wherein Mr. Baker reckons, "that in the broad-caſt, conſiſting of a ſucceſſion of fallow, wheat, and oats every third year, he charges nine barrels of wheat per acre produce from each crop. The fallow year is loſt: and the oats, yield in value to the wheat, only as four to nine. In the drill way, he obtains ſix barrels of wheat every year, in a conſtant ſucceſſion." It is proper to obſerve, that this is on the plantation acre, which contains 7840 ſquare yards. The total expence, including rent, *communibus annis*, in fifteen years, is 21. 10s. in the broad-caſt; and 21. 5s. 1d. in the drill culture, according to his ſtate of them; which is 4s. 11d. annually, in favour of the latter. But the difference of the value of the produce, which is to be added to this ſaving, is ſo great, that it appears, as he ſays, according to his ſtate, "a farmer, having forty acres of tillage, ſuppoſing him to direct his attention to bringing it to the Drill Culture, would make, in fifteen years, 969 l. 10 s more than he can in the Common Huſbandry: which is ſuch an advantage, that the greater profit in the drilling acre will purchaſe the fee-ſimple of that in the Common Huſbandry at twenty-ſeven years purchaſe, valuing the land at eighteen

" ſhillings an acre: Thus it appears, that, in " every fifteen years the fee-ſimple of all the " tillage-lands in the kingdom is loſt to the " community by the common courſe of til- " lage."

Mr. Baker was a very accurate experimenter, and had experience of horſe-hoeing ſeveral crops, turnips, cabbages, &c. in which he ſucceeded; but had not then experienced the horſe-hoeing culture of wheat, for a ſucceſſion of years: and, as it ſeems from a quotation he makes, that he depended, for information of the hoeing culture of wheat, upon an edition of Mr. Tull's Huſbandry, made by a perſon employed by the late Mr. Millar the bookſeller, who ſeems not to have fully underſtood Mr. Tull; Mr. Baker appears to have been led into a miſtake, viz. to ſuppoſe, that pulverization was the great principle in the New Huſbandry; which without doubt is indiſpenſably neceſſary, and will go far in obtaining good crops of ſuch plants and roots as are thus cultivated for one year: but drilled wheat crops have ſeldom any manure beſtowed upon them, and are repeated every year for many years in ſucceſſion: and, as the wheat crops draw nouriſhment every year from the ſoil, this continual exhauſtion requires likewiſe a conſtant recruit of vegetable nouriſhment: otherwiſe the earth will be impoveriſhed, and the crops muſt decline.

The

The tillage, breaking, hoeing, and pulverizing the ſoil, are operations performed by ploughs and hoes: but theſe operations do not add any new matter to the ſoil; they reduce the ſoil into fine tilth; but mere pulverization does not, of itſelf, increaſe the vegetable nouriſhment, which has been taken notice of above: for earth made ever ſo fine *in vacuo*, and where no air is admitted, will never be enriched, in the ſmalleſt degree, by mere pulverization; it muſt come in contact with the air, or atmoſphere; from whence alone it can be recruited with vegetable nouriſhment. The not being informed, and attending to this, was the reaſon that Mr. Baker failed in the hoeing culture of wheat, as will appear hereafter.

Mr. Doſſie ſpeaks doubtfully of what Mr. Baker ſuppoſes the drilled crops of wheat would produce annually, as he had not then ſeen many authentic experiments of drilled and horſe-hoed wheat crops in Britain; and Sir Digby Legard's being the moſt clearly related, he had ſtated his average of wheat crops at only twelve buſhels per acre, inſtead of about ſixteen buſhels computed by Mr. Baker. Yet Mr. Baker's was a moderate computation. His firſt years horſe-hoed crop was greater than he had computed; and he might have realized his computation, or higher, had his crops been cultivated in the beſt manner.

To underſtand his eſtimate, it may be proper to obſerve, that the Iriſh plantation-acre is to the Engliſh ſtatute acre, as 7840 ſquare yards to 4840; or nearly as 8 to 5. The Iriſh ſtone is 14 pounds.

Their barrel of wheat is 20 ſtone, or 280 pounds; which is four Engliſh nine-gallon buſhels. Their barrel of oats is 14 ſtone, or 196 pounds.

Mr. Baker being experimenter to the Dublin ſociety, he was directed by them to make a comparative experiment of the drill and broad-caſt methods; and he allotted one plantation acre to be drilled annually with wheat, and horſe-hoed for a courſe of years; and he ſowed two contiguous half-acres, of the ſame ſoil as the other, broad-caſt; the ſeed of one half-acre to be covered with the plough, and of the other with the harrow.

Theſe two acres were drilled with turnips in 1764 upon five-feet ridges, which were horſe-hoed. And in 1765 they were ſown with barley, which was drilled, two rows upon each ridge; the beſt part produced a good crop, the reſt was inferior; the barley being ſown too late, and the ſeaſon unfavourable.

In

	l.	d.	s.
In 1765. The one acre was ploughed once, to form the new ridges, coſt,	0	10	4
October 5, Harrowed the ridges, 4½d. and drilled 6ſt 5lb of red lammas wheat, 6s 11½d.	0	7	4
November 20, Winter horſe-hoeing, with two horſes,	0	1	7
1766. March 15, Spring-hoeing with the ſingle cultivator cloſe to the rows,	0	1	2½
—— Ditto with double cultivator once along the intervals,	0	0	8
—30th, Horſe hoeing the intervals a ſecond time, turning them to the rows,	0	1	5½
May 12, Weeding the partitions,	0	0	7¼
June 17, Third hoeing the intervals towards the rows,	0	1	5
—— Deepening the middle of the interval with double cultivator,	0	0	8
Auguſt 28, Reaping, 3s 4d. Threſhing 7bar. 11ſt. 5lb. at 9d. per bar. 5s. 7½d.	0	8	11½
September 29, One year's rent,	0	18	0
Total expence, of the horſe-hoed acre of wheat, the firſt year,	2	12	2¾

As ſtated by Mr. Baker in his report to the Dublin Society.

1766. The produce of the drilled acre,

	l.	s.	d.	l.	s.	d.
Wheat, 7bar. 1ſt. 5lb. at 30s. per bar.	11	7	0¾			
Straw, 39cwt. 1qr. and 22lb. at 9d. per cwt.	1	9	6¾			
Produce of this acre,	12	16	7			
Expences as above,	2	12	2¾			
Profit on this acre the firſt year,	10	4	4¼	10	4	4¼

1767.	The second year it was drilled in double rows and five feet ridges, with 5ſt. and 2lb. of red lammas wheat, the 16th. of October, 1766, and cultivated exactly in the ſame manner as the firſt crop; weeding coſt 8d. reaping 3s. threſhing 8d. per bar. and the whole expence was,				2	11	6¼	
	Auguſt 20. The crop was reaped and produced,							
	Wheat 5 bar. 12 ſt. 7lb. at 25s.	7	0	7½				
	Straw 29cwt. 2qrs. 27lb. at 9d.	1	2	3¾	8	2	11¼	
	Profit the ſecond year,				5	11	5	5 11 5
1768.	The third year. The culture was the ſame as the two preceding years, and coſt 7s. 7¾ It was drilled the 18th of October, 1767, with 5 ſt. and 2lb. of ſeed, at 25s. per bar. coſt 5s. 1½d. Reaping, 27 Auguſt, coſt 3s. 6d. and threſhing, 2s. 0½d. at 8d. per ſtone; the total expence,				2	7	9¼	
	Produced, Wheat 3bar. 1ſt. at 25s.	3	16	3				
	Straw, 16cwt. and ¼ at 9d.	0	12	2¼	4	8	5¼	
	Profit the third year,				2	0	8	2 0 8

The annual decreaſe of the crops, determined Mr. Baker to give up the ſcheme of ſucceſſive crops of wheat, drilled upon five-feet ridges; and he ſuppoſes, that by drilling a double row upon ſix-feet ridges, ſome of the incon-

inconveniences which he found might poſſibly be avoided. He then ſtates his objections to drilling on five-feet ridges; and aſſigns theſe as the reaſons why he did not ſucceed.

" His firſt objection is, that upon poor " cold ground the wheat is too late in ripen- " ing, eſpecially in ſo moiſt a climate as Ire- " land, and where there is ſo little ſun "— This objection relates to drilled wheat, which, by the nouriſhment it receives from the hoe-plough, is ſomewhat longer in ripening than wheat ſown broad-caſt; but the difference is not ſo great as wholly to exclude drilling there, as is intimated in this objection: for, as mentioned above, Mr. Baker drilled one acre; and contiguous to it he ſowed two half-acres broad-caſt, all of them were ſown the ſame day, viz. the 5th of October. Theſe two half-acres were reaped the 23d of Auguſt; and the drilled acre was reaped the 28th of Auguſt, which was only five days later: this was ſo ſmall a difference as ought not to exclude the hoeing culture of wheat, if otherwiſe the moſt profitable. Beſides, it is to be obſerved, that this wheat was not ſown till the 5th of October; which, had it been ſown earlier, would have been earlier ripe: ſo that this is no valid objection againſt drilling of wheat in Ireland, even upon ſo cold land as this was.

2. Mr. Baker objects next, " that after " taking four or five crops in this way, the " partitions

" partitions throw up ſuch a quantity of weeds, " poppies, hog-fennel, &c. particularly upon " poor land, and in a wet ſeaſon, that no " labour (conſiſtent with profit) can eradicate " them, but fallow and turnips. And that, " if the corn is ſtrong, ſo that the hoe-plough " cannot operate *after June*, the like weeds " riſe wonderfully in the intervals."——It is certainly difficult to eradicate weeds in theſe circumſtances. Yet we find that Mr. Tull conquered the weeds in his poor land: and he adviſes, when the hoe-plough happens to be ſhut out, to give the land a light hand-hoeing, which would keep down the weeds; and this hoeing would be well repaid, by the improvement it would make in the land. Beſides, it is found, that a good horſe-hoeing in June, before the wheat bloſſoms, cauſes the ears to be fuller of grain, than deferring it till after the wheat has done blowing; though without doubt hoeing then, and alſo after the blowing, do both contribute to improve the crop. But admitting that four or five crops can be taken of hoed wheat, and there ſhould then be a neceſſity of ſome intermediate crop to be taken, of turnips, beans, &c. to clean the land; the following four or five crops may then be drilled wheat; as was the caſe with Mr. Craik; but he does not for that reaſon give up drilling of wheat.

3. Theſe ridges were five feet broad; but, if made ſix feet broad, he thought the hoe-plough

plough might be introduced oftener, as there would be more room in the intervals: but Mr. Tull's ridges were narrower than five feet, as were thoſe of other cultivators who have ſucceeded in this culture. "It has, ſays he, "been after the culture of the intervals was "finiſhed [after June, as above] that they "have ſhot up, and formed their ſeed; and "which I conceive to be productive of them "in the ſucceeding year," and this may be in ſome meaſure prevented as before mentioned.

4. That, in ploughing theſe five-feet ridges after harveſt for the ſucceeding crop, the ſtubble mixed with the mould of the intervals; and he ſays he found by inſpection that this was the cauſe of the third crop being ſo ſmall. The ſtubble interfered with the coulters of the drill plough in its paſſage, and cauſed the ground to remain hollow about the ſeed in many places; and the winter's rain, lodging in theſe hollows, periſhed the plants; whence, ſays he, a great diminution of our (third) crop. Six-feet ridges may remove this objection alſo; becauſe in ploughing the ground for a ſucceeding crop, the ſtubble of the preceding one will not be ſo apt to approach the middle of the new-made ridges, as when the culture is carried on with narrower ridges. Removing the ſtubble would be a troubleſome and expenſive buſineſs, to clear a large quantity of land, beſides robbing the ground of ſo much manure as the ſtubble would make.—

The

The two great furrows are thrown up firſt in a high ridge, the plough going near the rows of ſtubble, ſo that the two next furrows do not riſe ſo high, as to make the ſtubble interfere with the drill plough. Other cultivators have not found this inconvenience upon narrower ridges; nor, it ſeems, did Mr. Baker find it till the third crop, and therefore was not a ſufficient reaſon for diſcontinuing this huſbandry; the next objection appears to be the principal reaſon of it.

5. "Though it ſeems to have been the "opinion of many writers upon this huſ- "bandry, that ſuch conſtant production of "crops without intermiſſion does not im- "poveriſh, but on the contrary improves the "ground by the culture beſtowed upon it in "this huſbandry; but I find this not to be the "caſe: for certain it is, that the capability "of the ground to feed plants, is every year "leſs, after it has produced a crop of turnips. "I am afraid this objection will be found in- "conteſtably true in practice, with five-feet "ridges; how far thoſe of ſix feet may remove "it, I ſhall wait until my experience ſhall in- "form me."——If this argument was to be depended upon, there was no occaſion to bring any other objection againſt the New Huſbandry. Mr. Baker ſpeaks here incautiouſly, and oppoſes his one unſucceſsful experiment to the continued practice and ſucceſs of the author of this huſbandry; and of the other

gentlemen of character abroad, who have confirmed its principles upon large tracts of land of various kinds. But it is plain that Mr. Baker fell into an error that others have done, by ſuppoſing that pulverization and expoſure were the ſame. Mr. Baker ſhould have cultivated his wheat with the hoe-plough, which anſwers both theſe purpoſes: but he ſubſtituted cultivators inſtead of the hoe-plough; theſe were invented by M. De Chateavieux, as uſeful inſtruments in ſome particular caſes. They are not ploughs, they have neither coulters nor earth-boards; and do not turn the ſoil and expoſe a new ſurface to the air, or atmoſphere, as a plough does. M. De Chateavieux called the ſingle cultivator a *miner*, becauſe it works wholly under ground, raiſes the mould a little, which ſinks down again where it was before as ſoon as the cultivator is paſt; but does not turn the mould, nor expoſe a new ſurface to the immediate action of the air, which is eſſential in this huſbandry; as this is the principal means whereby the land is recruited of the vegetable food, or nouriſhment, whereof it is partly exhauſted by the growing crop. Breaking or pulverizing the earth makes it lighter and more open, whereby the celeſtial influences can more eaſily penetrate into it than when it is cloſe and hard; but the ſoil is not by any other means ſo effectually and immediately enriched, as by turning and expoſing it to the immediate action of the atmoſphere,

as

as we have taken notice of before, and is directed by the author of this husbandry; especially as necessary in cultivating land for successive crops of wheat: for these crops have not any assistance from manure, nor is the land recruited of its fertility by any other means than by pulverization and exposure. Land that is rich, and already much impregnated with the vegetable food, will bear a good crop by good hoeing, or pulverizing only, without much exposure, for a single crop, especially if also manured; this seems to have misled many who were not well acquainted with the principles of the New Husbandry: they generally recommend hoeing and pulverizing the land, and to these they attribute the success of the hoeing husbandry; but though this will do for one crop, it is evident, from the hoeing culture of wheat, that these alone will not do for a succession of crops; but they will gradually decline every year, because the earth is not recruited by pulverizing, unless a new surface be also exposed to the air, or atmosphere. It is this that recruits the earth of the vegetable food: the pulverizing prepares the earth to receive the new vegetable food, when duly exposed to the air. The single cultivator is a triangular hoe, and resembles one of the triangular hoes of the nidget, only larger and longer; the double cultivator consists of two single cultivators placed side by side in a frame: they may be run along in light loose mould, but

but are by no means proper to be ſubſtituted for the hoe plough; and here appears the error of Mr. Baker's culture. His winter or firſt horſe-hoeing, he takes notice, was performed the 20th of November with the hoe-plough, which turned the earth from the rows of wheat. The ſecond horſe-hoeing with the hoe-plough was not performed till the 30th day of March, and then the earth was turned back again towards the rows of wheat. The third horſe-hoeing with the plough was not performed till the 17th of June, and then the earth was not again ploughed away from the rows, as the author of this huſbandry directs, and that the plough ſhould go cloſe to the wheat; but, on the contrary, ſome looſe earth was thrown up from the intervals, the 17th of June, up to the ridges; ſo that inſtead of four hoeings with the plough, two of them cloſe to the wheat, here was only one hoeing performed in that manner the 20th of November; and after the earth was turned to the wheat by the hoe-plough, it was no more ploughed and turned from the wheat afterwards, as ſhould have been done; and what other tillage was given in the intervals was wholly performed by the cultivators, not proper to be ſubſtituted for the plough.

Indeed the land here was properly horſe-hoed only twice, inſtead of four horſe-hoeings that ought at the leaſt to have been given it. Mr. Tull at firſt gave his wheat ſix horſe-hoeings,

hoeings, and directed ſo many to be given; and when he had reduced his ridges from ſix feet broad to four feet eight or nine inches, he found four ſuch hoeings were ſufficient to nouriſh the crop, and enrich the land for the ſucceeding crop: but directs, that when the hoer finds, by a decreaſe in his crops, that the land had not been ſufficiently improved the preceding ſeaſon, he ſhould hoe it oftener, or give the rows a dreſſing of fine manure about the month of February; neither of which was done here, though the crop evidently declined. Yet it was reaſonable to have followed the directions of the father of the New Huſbandry, who had long experience in it: for no novice in this Huſbandry ſhould raſhly depart from the rules laid down, from experience, by ſo able a cultivator. The examples above given are a ſufficient confirmation of the principles of this Huſbandry, and cannot be invalidated by the ill ſucceſs of thoſe who depart from the eſtabliſhed rules of this culture.

I have been particular in reciting this miſcarriage. Mr. Baker acted in a public capacity, was a very accurate experimenter, and had ſucceeded admirably in raiſing ſingle crops of different ſorts; and it was a misfortune that he deviated from approved rules in the culture of drilled wheat, a plant of ſo general uſe; his being ſo ſanguine of ſucceſs (before he had practiſed this culture), as appeared from the calculation he had publiſhed, and referred

to

to by Mr. Doſſie, of the great advantage to be made in Ireland, from ſucceſſive hoed crops of wheat, compared with the common courſe of culture there (of a crop of wheat, one of oats, and the third year fallow), his failing of ſucceſs was very diſcouraging to others; although the drilled crops he ſtates are not more than may be really obtained in the New Huſbandry duly performed. Some, who favoured the drill huſbandry, wiſhed him ſucceſs; but others, as he takes notice, hoped otherwiſe; and his not ſucceeding may have ſome effect in Britain, but has ſo diſcouraged moſt in Ireland, that probably the hoeing culture of wheat will not again be attempted there in a long time.

Since writing the above, I have ſeen a treatiſe on Huſbandry, entitled *Rural Improvements*, very lately publiſhed. The author is a gentleman of practical knowledge, and the work contains many valuable and judicious obſervations: he has alſo practiſed the hoeing huſbandry, and recommends it.—The author ſets out with this general propoſition, that landed eſtates may be improved to double their preſent value. "This," ſays he, "it "ſeems, has been thought by many an ex- "travagant notion, without any reaſonable "ground or foundation in the nature and "reaſon of things."

"Strange as this opinion may ſeem to "many, it is not the mere creature of a

" warm imagination, but founded on a ſeries " of experiments and obſervations, made on " an extenſive ſcale by the author, who in " numbers of inſtances could confirm his " doctrine by his practice, and produce the " cleareſt evidence that thoſe improvements " are capable of being carried much higher, " and to much greater advantage, on the " author's principles, &c. by the ſame means " he uſed."

P. 47. " My idea of improvement does " not only comprehend the increaſed value of " the thing to be improved, but that the im- " provement be more than equivalent to the " expence which attends the obtaining it. " For I can have no idea of any thing being " an improvement which is attended with " loſs. Suppoſe a gentleman poſſeſſed of an " eſtate of 500l. per annum, and that he has " 1000l. in the ſtocks, which brings him " 40l. per annum. Should he convert his " ſtock into money, and expend the ſame in " improving his eſtate, which when effected " only produced 30l. per annum; this ſurely " could never be thought an improvement. " But ſhould the expending the 1000l. add " 100l. per annum to the value, it might " then with great propriety be called an im- " provement. And with reſpect to the tenant; " ſuppoſing in his farm he has 100 acres of " land, which are conſidered as little better " than waſte, and not valued to him at more

" than

" than a ſhilling an acre, and which perhaps " he does not make half a crown an acre of, " being only applied to the run of a few " young cattle in the ſummer; if a method " could be pointed out, by which ſuch land " might be made to produce 10 s. an acre " beſides paying the expence, it is very clear, " the improvement would be in the propor- " tion of four to one, or 400 per cent. " Now this is the improvement we propoſe, " and have no doubt of pointing out the " means by which it may be certainly " effected.

" Few Huſbandmen have any notion of " improvement, independent of manures of " ſome kind or other: but, in many places, " they are not to be obtained at any rate: " and many lands are ſo ſituated and circum- " ſtanced, that the expences of manuring (if " manures could be got) would far exceed all " advantages; and therefore would ter- " minate in loſs. But I maintain, that " ſuch lands may be improved, independent " of any manure but what may be raiſed " from the land itſelf. Indeed there is land " ſo barren, as to be incapable of any im- " provement; ſuch as abſolute bog, before it " is drained; rock, and pure ſand; but land " that will bear furze, fern, broom, thiſtles, " or weeds of any ſort, may be cultivated to " uſeful purpoſes, without the expence of " carrying manure to the ſame.

" I by no means mean to decry the uſe of " manure; I too well know its value; and " that farmer muſt be very indolent, or ig- " norant, whoſe lands are not fertile, if he " can have it in plenty upon moderate terms, " if he neglects it; but the quantity of it is " limited, and not to be purchaſed in the " quantities deſired: therefore, if land is not " to be improved without manure, ſome hun- " dred thouſands of acres can never be im- " proved at all.

" It may be ſaid, attempts of this kind " have been formerly made without ſucceſs; " and that much land, which has been in tillage " heretofore, now lies neglected, in the con- " dition above repreſented. This is certainly " true, and what I have frequently ſeen; " but proves nothing againſt this plan of im- " provement, though a forcible impeachment " of the avarice or weakneſs of the occupier. " If men will ſacrifice all future advantage to " a little increaſed preſent gain, the fault is " their own, and not the lands they poſſeſs.

" Suppoſe a farmer ſhould ſpade and burn- " beat a tract of ſuch land as above deſcribed, " and reap a middling crop of wheat the firſt " year, a thin crop of barley the ſecond, and " a very poor crop of oats the third, not " enough to pay the expences of tillage; can " it be a wonder, that ſuch land ſhould for a " long ſeries of years be conſidered as abſo- " lutely barren and worthleſs? Such a prac-

" tice

" tice would beggar any land; and yet this
" is the practice commonly purſued. Whereas,
" had the farmer contented himſelf with
" one crop of corn, and ſucceeded that by an
" ameliorating crop, inſtead of impoveriſhing
" and reducing his land to a ſtate of beg-
" gary, it might have been in a ſtate of
" conſtant improvement. The art required
" is, to raiſe a tolerably good crop at firſt;
" that being obtained, he muſt be a poor
" manager who cannot keep-on with ad-
" vantage.

" This is not a mere matter of opinion.
" I have a moor of 120 acres, which, for
" fifty years back, never let for more than
" eighteen pence an acre. Some of the old
" people there remember its bearing as good
" corn and clover as any land in the pariſh,
" though I have ſome of four pounds an
" acre. I have it now in hand, and laſt year
" had a field of wheat of about five acres,
" which had been ſpaded and burnt the ſum-
" mer before. This produced ſixteen buſhels
" to the acre, which, at five ſhillings a
" buſhel, amounts to four pounds; and af-
" forded a nett profit of forty ſhillings an
" acre, or near it. The land is now in ſuf-
" ficient heart to produce a good crop of
" barley; but that I will diſpenſe with, and,
" inſtead of it, take an ameliorating crop of
" turnips, clover, or ſome hoeing crop, that
" may improve it. The raiſing large crops

" of corn by dint of manure, at a very heavy " expence, comes not within my idea of " improvement; and in this the moſt va- " luable part of improvement conſiſts, at " leaſt ſo far as arable lands are the ſubject " thereof."

The author's method is undoubtedly right, of taking but one exhauſting crop from burn-beat land; but, though he is a favourer of the New Huſbandry, he does not introduce it here, though very proper to do ſo; his practice ſeems to have been more in hoeing ſingle crops of beans, peaſe, turnips, &c. than in cultivating wheat in ſucceſſive crops by horſe-hoeing, which, in the ſtrict ſenſe, is properly the New Huſbandry, and, in the preſent caſe, might have been introduced upon this land for the firſt crop after burn-beating, the land being firſt well pulverized; and, if the crop had been even leſs than ſixteen buſhels, the expence would have been ſmall; and, what is moſt material, the land would not have been impoveriſhed by a crop of wheat, but would have been certainly improved; and no occaſion to think of an ameliorating crop of turnips, &c. to ſucceed the wheat, but to continue every year to obtain a crop of wheat, which is much more profitable.

Another inſtance of the author's improvement without manure, is of a general nature, and deſerves to be well conſidered; and here likewiſe the Drill Huſbandry may be of

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ſingular uſe. " I proceed," ſays he, p. 90. " to the conſideration of the improvement of " ſuch lands that are ſo circumſtanced as not " to be within the reach of the common or " uſual method of improvement. Moſt large " eſtates have very large quantities of land, " that lie remote from the farm-yard; ſome- " times ſeveral miles, and often very difficult " of acceſs, on account of ſteep hills and bad " roads: therefore ſuch lands have no chance " to be manured with dung, aſhes, lime, or " any ſuch thing, the carriage of which " would come high: and therefore they are " conſidered as waſte lands, not worth more " than half a crown an acre, and are there- " fore ſuffered to be over-run with brambles, " broom, or furze, from one generation to " another, though very capable of bearing " very good corn, if proper methods were " purſued. I have, at this time, ſeveral " hundred acres exactly thus circumſtanced, " which ſerve to no other purpoſe, but to " ſummer a few ſheep and young cattle. " Theſe are the uſes thoſe lands have been " put to for a great number of years; and, as " their condition is no better than formerly, " no body conſiders them of more value; and " conſequently I can get no more rent for " them. I have therefore taken ſeveral of " them into hand, with a determined reſo- " lution to improve them, if poſſible; which " I have not the leaſt doubt of effecting. I

" cannot convey an idea of my method better,
" than by an account of the courſe I am now
" purſuing.

" My firſt eſſay was on what is called an
" *over-land* (that is, land without a tenement
" belonging to it) of above ſixty acres;
" thirty of which lay on the north ſide of a
" ſharp valley. The deſcent on one ſide, and
" the aſcent on the other, are ſo quick, that
" it is not practicable to carry any manure to
" the ſaid thirty acres, but on horſes backs;
" the expence of which would be too great
" for it to anſwer. The laſt tenant had left it
" in woeful plight; having, as he ſaid,
" ploughed it as long as he could get two
" corns for one; miſerable condition indeed!
" The firſt two years I left it to the manage-
" ment of my hind, who cleaned it, and
" ſowed it with every ſort of grain; but the
" return was ſuch as left nothing for rent.
" At length, he told me, it was to no pur-
" poſe to plant it any more, unleſs I would
" be at the expence of beſtowing a good dreſ-
" ſing upon it, to improve it. This I re-
" ſolved not to do: for I have no idea of
" any thing being an improvement, that
" does not pay the extra expence, and increaſe
" the nett profit.—Indeed, you may increaſe
" the quantity of produce, and put the
" land into better condition: but if, to effect
" this, you are at more expence than the
" improvement will repay, I muſt call this

" meaſure

" meaſure the reverſe of improvement; for, " though your land may be improved, your " fortune is impaired; this indeed would be " buying gold too dear.

" I therefore told him, I ſaw clearly, it " would never anſwer the expence of carrying " manure into it: I would try another me- " thod, from which I hoped better ſucceſs " than he had met with: he anſwered, he " wiſhed I might, with a ſmile that plainly " denoted his incredulity. So averſe are " moſt of theſe people to every method they " have not been accuſtomed to.

" However, he was to follow my direc- " tions. I ſaid to him, You ſee, here are the " two upper fields (about eleven acres) have " now lain above a year ſince the crops were " got off; they have nothing growing upon " them but ſtrong weeds, which are the na- " tural produce of the ſoil, as thiſtles, horſe- " daiſies, brambles, &c. theſe are firſt to be " eradicated: therefore ſet a couple of ſtrong " ploughs to work, fix oxen to each, and " plough the two fields deep and well; then " let them, as ſoon as proper, be well- " dragged, rolled, and harrowed, and the " ploughings, &c. repeated, until the land is " clean, well-opened, and pulverized. This " was repeated at proper intervals through " the winter, and until the following May. " By that time, they were got tolerably clean, " and in good condition. The ſoil of each

" of

" of theſe fields were very different, though " no larger ; they each conſiſted of ſome very " dry land, and ſome altogether as wet. The " firſt was a poor, lean, flatey ground; the " latter a tough, moory, cloſe earth, mixed " with an imperfect marle, which held water " like a diſh. I had a pit ſunk in the moſt " depending part, to drain off the water; and " ordered the earth to be ſpread on the flatey " ground at a proper time. As I ſaid, the " land was in good order the May following; " I therefore ordered the moiſt parts of the " fields to be ſown with rye-graſs, and the " dry part with trefoil and burnet; which, " as ſoon as pretty full blown, I ordered to be " mowed, made into hay, and ſet up in a " rick, in a corner of the upper field. The " fields to be then laid up until October, or " until the graſs had done growing; then to " turn into the ſaid fields half-a-dozen mares " and their foals, which I had at that time, " with ſome young cattle, to have the run of " the ſaid thirty acres during the winter. I " alſo ordered a linny, or hovel, to be erected " in the moſt ſheltery part of the fields, large " enough to ſhelter a dozen horſes under it, " for them to go into at pleaſure ; a rack to " be put up; and, when the graſs was nearly " eat up, to cut the rick, and fill the rack " once or twice a-day, as might be neceſſary; " alſo to carry ſtraw to litter the hovel, " which ſhould be cleaned out once in a week

or

" or ten days, and a dung-heap formed of the " ſame. In this manner the cattle ſhould re- " main until the end of February, or until " the graſs began to ſpring.

" Whilſt this is doing, another of the fields " ſhould be ploughed and got ready to ſow in " like manner the following May. As the " extent of the paſture will be increaſed, ſo " may the number of cattle to be wintered on " it; and, at the beginning of the ſecond win- " ter, there will be dung enough to manure " one of the fields, which I would have " ſpread on the upper field in December or " January at fartheſt; by which means, I " hope to have another good crop of graſs. " Thus are you to go on year after year, and " field after field, until the whole has been " well cleaned, cultivated, and dreſſed."

" I do not expect it will anſwer to let it lie " for graſs more than two or three years; " therefore, in the winter after the firſt year, " I would have dung ſpread on the field or " fields that were mowed, which will give en- " couragement to the next crop, and leave it " ſufficiently in heart to bear a crop of barley " or oats, with which I would have you " ſow, either clover, rye-graſs, or trefoil, as " beſt ſuits the land, taking but one crop of " corn to two of graſs, which cannot fail " of improving thoſe lands, as I would have " them conſtantly fed in the winter as above " directed; and the dung that is made by the

" cattle to be uſed for manuring that land " only: for it is a kind of injuſtice, if one " may ſo ſpeak, to carry the produce off, and " not leave the manure that ariſes from it, " and is its natural due; a robbery that is " too frequently committed, which keeps ſuch " land in a perpetual ſtate of poverty.

" Theſe thirty acres, in the condition I firſt " found them, were not worth more than " half a crown an acre; but, by the above " management, are well worth ten ſhillings " at leaſt; and by the ſame means are capable " of much more improvement.—This, in my " own opinion, is a ſpecies of improvement that " deſerves the cloſeſt attention; as perhaps " there is not another to be found, which " may in general be made ſo advantageous and " extenſively uſeful. It comprehends every " kind of land that is capable of improve- " ment; and the diſtance from the farm-yard " is no very great inconvenience, as all the " labour it requires on that account is, a boy " going once a-day to give the cattle fodder, " and ſpread ſome litter, and this not until " the graſs is gone, and the weather ſevere; " then the litter is neceſſary to increaſe the " quantity of dung, as well as to be of uſe to " the cattle. By ſuch management, land that " is very indifferent in its natural ſtate may " very ſoon be made very good corn land, to " the great advantage of the owner."

This

This is an uncommon and very valuable ſpecies of improvement, not only in regard to the value of the improvement, which is very great, but with reſpect to its extenſiveneſs, as there is not a county only, but ſcarce a pariſh in the kingdom, but this may be of great uſe to: and it is here inſerted at length, not only for that reaſon, but alſo becauſe this method may be improved by the hoeing huſbandry.

The author propoſes to take a crop of corn, barley, or oats, once in three years, after the land is made clean, well pulverized, and fertilized, with the dung of the cattle fed upon it, and there is no doubt but this may be obtained; but a better crop may be obtained by drilling the ſeed in equidiſtant rows a foot aſunder, and well hand-hoed; ſome inſtances of this have been taken notice of above, and many more might be produced to prove it much ſuperior to ſowing broad-caſt: for half the ſeed at leaſt is ſaved by drilling, the land is cleaned by the hoeing, and at the ſame time is improved. It might indeed have been expected that the author would have taken ſome notice of this, as he recommends the drilling and hoeing huſbandry much; but his practice ſeems to have been more in other crops thus cultivated than corn. However, it is certain from experience, that this is a much more profitable method than ſowing broad-caſt; the clear profit is much greater, after paying the expence of once or even twice hand-hoeing.

But

But there is another advantage, that in ſome circumſtances may be obtained in this way; the land that commonly, and in the Old Huſbandry, is thought proper only for barley or oats, will produce good crops of wheat, which is much more profitable than ſummer corn: this is found true, not only in horſe-hoeing, but alſo in hand-hoeing, if well performed. Land that lies with ſo great a declivity, as ſome of theſe deſcribed by the author, cannot indeed be horſe-hoed; the plough cannot turn up the furrows againſt ſuch a ſteep bank: but all land that can be ploughed and ſown broad-caſt, may alſo be drilled and hand-hoed, to the great benefit of the occupier. But all land thus circumſtanced, worth no more than half-a-crown an acre, and improveable to ten ſhillings, may in general be cultivated with the hoe-plough, to a greater advantage than they can by hand-hoeing; nor ſhould they be put in the horſe-hoeing culture, while worth half-a-crown an acre, but may to good profit when worth ten ſhillings. If the land is dry and healthy, it may be improved in the author's method with ſheep, and their dung ſaved in winter to dreſs the land: but in whatever method it is done, the hoeing will make the improvement the more expeditiouſly, and, by ſaving the manure from the arable land, will make ſuch improvement more extenſive.—

"The great uſefulneſs," ſays the author, p. 62. "and benefit of the New Huſbandry, "is

" is no where ſo ſenſibly felt and experienced,
" as in lands that are ſo ſituated as not to ad-
" mit of manure, but at ſo heavy an expence
" that their crops would by no means anſwer;
" the great advantage of this culture is in this
" caſe ſelf-evident, where a crop, at leaſt
" worth from forty ſhillings to three pounds,
" is obtained at the expence of fifteen ſhillings
" beſtowed in tillage, and five ſhillings in
" ſeed: a very handſome return for land,
" which, under ſuch circumſtances, cannot
" be valued at more than five or ſix ſhillings
" an acre. Immenſe quantities of land are
" thus circumſtanced, and by this method are
" capable of incredible improvement, provided
" the owners or occupiers could provide a
" competent number of workmen and horſes
" for the purpoſe."

The number of men and horſes, neceſſary for the New Huſbandry, are not to be computed from the number that is neceſſary in the Old Huſbandry, for the ſame extent of land: for, whatever number of horſes are uſed in the Common Huſbandry, one half that number is ſufficient for horſe-hoeing the ſame land; Mr. Craik uſed but two horſes for hoeing, and Mr. Baker but two in his ſtiff land, except in uncommonly hot days: and one man is ſufficient to drive a team of four horſes; but where only two horſes are employed, a driver is not neceſſary even in the Old Huſbandry, much leſs in the New; in which the ſtraight ridges guide the

the horſes to go ſtraight, and are ſoon brought to it, as I have experienced; nor is more than about half the number of horſes neceſſary for hoeing, as for common ploughing.

" The New Huſbandry is an improvement " of the old, and, notwithſtanding all oppo- " ſition, great as it is, it does advance though " ſlowly. Planting beans and peas in rows, " and hoeing turnips, is pretty generally " practiſed in many counties; but is not of " very long ſtanding in the field culture, at " leaſt in many places.

" The principal intention of this method of " culture is to keep the land in perfect tilth, " and to keep it clean from weeds. In order " to this, the land at firſt ſetting off ſhould " be deep and well ploughed, harrowed, &c. " and made as clean as you can. The in- " tervals between the drills I would adviſe " to be of a good width, according to the ſize " of the plant you intend to ſow. One is " apt to grudge ſo much ground, which at " firſt appears unoccupied, but, before the crop " arrives at maturity, one always finds the " ſpaces too little; this occaſions a good deal " of trouble and vexation, and prevents your " uſing the horſe-hoe ſo effectually, or ſo long " as you ought. I have drilled beans, peas, " wheat, barley, carrots, potatoes, and lu- " cerne, and have always found before harveſt " I wanted more room. For beans and peas, " the diſtance ſhould not be leſs than three

" feet: for wheat, barley, and potatoes, two
" feet and a half; lucerne and carrots, two feet.
" I likewiſe prefer ſingle rows to double or
" treble, eſpecially until the land is got very
" clean and in good order: for, when planted
" in ſingle rows, the horſe-hoe may be worked
" near the rows, and the weeds diſplaced to
" the bottom; but, if planted in double rows,
" the ſpace between being narrow, the weeds
" cannot be diſplaced without the uſe of the
" hand-hoe, and then not deep enough to de-
" ſtroy them; and ſo much of the ground lies
" uncultivated. Double rows, I believe, afford
" larger crops than ſingle, in beans, wheat,
" and barley; and, when your land is in good
" tilth and very clean, double rows may be
" practiſed to advantage; but, if uſed before, I
" am perſuaded your land will never be clean.

" I have obſerved before, that the general
" opinion is, that the expence of inſtruments
" neceſſary for this practice is more conſider-
" able than it really is; which probably has
" in ſome meaſure prevented many from
" making ſome trials of its ſucceſs. I will
" therefore enumerate and deſcribe all ſuch
" as I have found neceſſary for this work.

" Every farmer muſt be provided with
" ploughs, harrows, drags, and a roller, for
" cultivating his land according to the old
" method: therefore theſe are not to be con-
" ſidered as an extra expence, occaſioned by
" the new practice. All the inſtruments that

" are neceſſary to this culture are four in " number; and two of theſe are equally uſe- " ful for the Old as for the New Huſbandry: " therefore theſe cannot be fairly charged as " and extra expence on the New.

" The firſt is a ſmall patent or Rotheram " plough, which may very conveniently be " worked very near the rows; and, if the land " is in tolerable tilth, one horſe, and that not " a large one, will be very able to manage " ſuch a plough. This is my hoe-plough, " and in all reſpects greatly preferable to every " thing I have ſeen called by that name; " with this you may go ſix, nine, or twelve " inches deep, as you pleaſe, and will pul- " verize the ſoil, in which conſiſts the great " advantage of this method of culture.—The " ſecond is the ſame plough with two mould " boards; this, in narrow intervals, throws " the mould up to the rows of plants on each " ſide at once going. Another uſe I put it to " is, to make clean open furrows of any " depth, and at any diſtance, the grain or " roots I have to place, may require. With " this inſtrument I make my drills for beans, " peas, wheat, potatoes, or whatever ſeed I " have to ſow: with it I can go any depth, " from two to eight or ten inches; and it " makes but one furrow at a time, like a " common plough; they may be made at any " diſtance, one furrow from another, that " your intended crop may require. This re-

" quires

" quires no nicety, no ingenuity; any man " that can plough a tolerable ſtraight furrow, " can do all that is required." [The author ſeems here to refer wholly to ſowing upon level ground, and not upon ridges; which are in general much preferable to level ground to ſow upon, or to be horſe-hoed. The double-board plough here mentioned is very proper to open furrows into which potatoes are to be dropped by hand, or beans; and in ſuch rows as are at a conſiderable diſtance, and require no great exactneſs to plant the ſeed in regard to diſtance and depth; but, where that is required, a drill-plough is much preferable to ſowing ſeed in theſe open furrows, and covering it afterwards, as it muſt be, by the plough, or by a hand-hoe; and the ſeed in this way is not ſo certainly covered at an equal depth, as with a drill-plough. Neither can corn or any ſeed be thus ſown ſtraight, as of wheat at a foot diſtance, to be hand-hoed. The drill-plough is in every reſpect the beſt inſtrument by much to ſow regularly, ſtraight, at an equal diſtance and depth, and moſt expeditiouſly; and horſe-hoeing wheat, and many other plants, is much preferable upon ridges to level ground.]

" The third inſtrument is what the in- " ventor [Mr. Baldwin] calls, I think, a horſe- " hoe; it is little more than an harrow, ſo

" ſhaped as to paſs eaſily between two rows " of corn. It is about four feet and a half " long, and ſixteen inches wide, and the tines " are made ſtrong and eight or nine inches in " length, with a couple of handles for the " ploughman to guide it. It is a very uſeful " inſtrument to break down and crumble the " lumps, and to drag out and clean away the " weeds, and may eaſily be drawn with one " horſe. It alſo well prepares the land in the " intervals to receive a crop of turnips, cab- " bages, or any thing elſe you may think " proper to plant, before you have got the " crop off the ground. This is not very often " practiſed, but ſometimes may with good " ſucceſs.

" The fourth and laſt inſtrument, that is " neceſſary to this practice, is the drill; with " which I ſow in rows the ſeeds of whatever " crops I have to plant; this requires no more " ſkill, ingenuity, or ſtrength, than to drive a " very light wheelbarrow along the furrows " the plough with the double mould-board has " made. The only care it requires is, before " you begin, to ſet it to the ſize of the ſeed " you have to ſow, and to ſupply it with " more ſeed as occaſion may require: which " may be four, ſix, or eight times in ſowing " an acre, juſt as you chuſe.

" This is the whole apparatus that is neceſ- " ſary in this method of practice; the expence " of which cannot exceed fifty ſhillings or

" three

" three pounds; which muſt be allowed to be " a mere trifle, eſpecially if it be conſidered " that the two ploughs are equally uſeful in " the old as well as in the new method."

[It has been obſerved above, that a pair of wheels are convenient, to mark the intended diſtance of the rows, or ridges, very ſtraight; a ſhort ſtone roller likewiſe, plain or fluted, though not abſolutely neceſſary, is ſometimes very uſeful, to break and cruſh the large clods in the intervals in very dry weather, eſpecially in ſtrong land. Such a roller in a pair of ſhafts, and ſhort enough to be drawn along the intervals, will effectually cruſh theſe hard clods, without waiting for rain, or hindering the hoeing. One horſe is enough for this roller: and, if the earth in the interval lies in a ſharp ridge, it will be convenient to open that ridge firſt, that the horſe may walk, and draw the roller after him, in the interval. This is ſometimes of great ſervice, as it preſently and effectually pulverizes the earth in the intervals; but ſhould be uſed only when the earth is very dry.]

" Prejudice and intereſt, ſays the author, " frequently warp the judgement, and make " men violent in the defence of one ſcheme, " to the utter deſtruction of another; though " perhaps equally uſeful and deſirable, under " different circumſtances. The truth of this " obſervation appears no where in a ſtronger

" light, than in the conteſt between the ad-
" vocates for the Old and New Huſbandry.
" They cannot be contented to uſe either as
" circumſtances may require, and render fit
" and uſeful; but one muſt be eſtabliſhed
" univerſally, to the utter extirpation of the
" other, or all is not right. In the foregoing
" part of this work, I have ſhewn that both
" may be uſed occaſionally to advantage; and
" that it is very wrong for a farmer to reſpect
" either, becauſe it is new or old: the only
" conſideration that ſhould weigh with him
" is, which is moſt likely to be attended with
" ſuperior advantage; and that only ſhould
" determine his choice. I have known the
" drill method decried from the ſmallneſs of
" the crop, when compared with the broad-
" caſt on the ſame land; but that is an erro-
" neous way of judging. Such a compariſon
" affords no criterion to diſtinguiſh the ſu-
" perior method; for it is not the quantity of
" produce, but the *net profit* the farmer
" ſhould be governed by. One field may pro-
" duce twenty buſhels of wheat to the acre,
" another but ten; the firſt may be a loſing
" crop, the latter a gaining one. This I have
" known happen more than once; and ſo muſt
" many others who reſide in counties where
" a farmer cannot dreſs and manure an acre
" properly, for wheat, under four pounds, and
" where twenty buſhels is deemed a good crop.
" Here, if, in the drill method, a farmer can

" get only eight buſhels by dint of horſe-hoe-
" ing, without the expence of manure, he
" will get more ſhillings toward the rent of
" his land by the latter method of culture,
" than he can do by the former.

" This correſponds with what I obſerved
" of Mr. Craik's crops, and expences of
" tillage: where it was ſhewn, that eight
" buſhels of wheat upon an acre were, at the
" price of five ſhillings per buſhel, fully ſuf-
" ficient to pay the rent and expences of a
" hoed-acre, even reckoning the rent high;
" and all above eight buſhels per acre was
" clear profit. The author allows here that
" even eight buſhels may be a profitable crop;
" which may ſeem incredible to a common
" farmer, though certainly true.

" I am certain, continues our author, from
" experience, that the drill culture may be
" practiſed to a great comparative advantage
" in many articles, and under many circum-
" ſtances; and I am ſorry to obſerve, that
" ſome of the oppoſers of this practice have
" treated the memory of the late ingenious
" Mr. Tull, to whoſe labours the world is
" much indebted, with great want of candour
" and unfriendly reflection. That he did not
" die in very affluent circumſtances, is no
" impeachment of his method of culture, nor
" of his honour and veracity. I had not the
" pleaſure of his perſonal acquaintance, but I
" am acquainted with ſome that had. I have

" been informed his eſtate was much too
" ſmall to maintain a family genteely, and
" grow rich; beſides, continual ill health many
" years before his death muſt help to impair
" his fortune. This however is diſingenuouſly
" imputed to his obſtinacy, in proſecuting a
" method of culture, which greatly hurt, if
" not ruined him.

" From all accounts, he was a man of un-
" doubted veracity: he tells us, he practiſed
" the drill huſbandry upon a large ſcale; hav-
" ing ſometimes one hundred acres of wheat
" in a year; that he followed the practice
" upon ſome lands twelve or thirteen years;
" that his crops were larger at laſt than at
" firſt; and his land not only in finer, but in
" richer condition than when he began the
" practice. Struck with his ſucceſs, and the
" advantages of his method, and convinced
" and ſatisfied by the reaſonableneſs of his prin-
" ciples, many perſons of great note and re-
" ſpectable characters have been induced to
" make trials of his method; which, in num-
" berleſs inſtances, ſucceeded beyond the moſt
" ſanguine expectation. Theſe are the late
" Lord Viſcount Townſend, Sir Digby Le
" Gard, M. Duhamel, M. De Chateavieux,
" Mr. Miller, and Mr. Baker a gentleman
" of Ireland. This is a very ſhort liſt to
" what might be given, but is ſurely abun-
" dantly ſufficient to outweigh intereſted ex-
" periments, though made by thouſands. Ex-

" periments

" periments made on the poor narrow ſcale of " a rood of ground are unworthy of the " name; indeed they have little elſe, and can " ſerve no other purpoſe but to talk about, in " the ample ſpacious field of a moſt heavy " voluminous work." [Meaning Mr. Young's, as elſewhere mentioned].

" I cannot on this occaſion help taking no- " tice, of the moſt unwarrantable partiality, " exerciſed by ſome writers, in conſtantly re- " ferring and appealing to ſuch paltry experi- " ments, as to the touchſtone or ſtandard of " truth. I would beg leave to aſk all ſuch, if " the pretended experiments of one, who " manifeſtly wrote with intereſted views, " ought to be ſet in competition with, or can " be deemed evidence of equal force with, " thoſe of the reſpectable diſintereſted gentle- " men above mentioned? Were the experi- " ments made by Lord Townſend, on the cul- " ture of turnips, true and genuine? or were " they fraudulent and deceitful? Were the " extenſive experiments made by Sir Digby " Legard honeſt and fair, or were they in- " tended as impoſitions on the public? I re- " peat the ſame queſtions with reſpect to the " reſt of the gentlemen, particularly Mr. " Miller (whoſe veracity I think equal to any " man's); and Mr. Baker, whoſe experiments " were very numerous, extenſive, and con- " ducted with great ſkill and care. If theſe " gentlemen's veracity ſtand unimpeached,

" how

" how dare any man place the ſingle teſti-
" mony of an intereſted haſty writer in oppo-
" ſition to them, and make his concluſions the
" teſt of truth? If they are impeached or
" ſuſpected of diſhoneſt practices, let the ac-
" cuſer ſtand forth, and make good his charge
" againſt them. Until that is done, no re-
" gard ought to be paid to concluſions, de-
" duced from experiments, which in many
" inſtances militate againſt, and invalidate each
" other.

" Notwithſtanding all that has been ſaid to
" the contrary, by the intereſted experimenter,
" and by thoſe who on certain occaſions en-
" deavour to ſupport him; it is a moſt certain
" truth, that there are few plants or vegetables
" cultivated in England for the uſe of man or
" beaſt, but receive great encouragement and
" benefit from the earth in which they grow
" being well pulverized and broken; and the
" moſt effectual way to do this, is by the horſe-
" hoe, or hoe-plough, whilſt they are grow-
" ing; and this is not to be done unleſs the crop
" is planted in drills or rows.—Theſe articles
" are not a few; lucerne, and all the various
" kinds of cabbages, beans, peaſe, the turnip-
" rooted cabbages of both ſorts, carrots, par-
" ſnips, potatoes, and I will venture to add
" turnips; and I am clearly of opinion, that
" ſainfoin and burnet will in time be found
" to be of the number."

We

We have given ſuch a number of authentic inſtances of the ſucceſs of the New Huſbandry, that it appears unneceſſary to give more particulars from this author, or from the foreign gentlemen he mentions, who were the diſciples of Mr. Tull, and do him great honour; their experiments were extenſive and very accurate, and much might have been taken from them; but it was thought moſt ſuitable to give principally the experiments made in Britain, and ſuch as were extenſive, and made in a great variety of different kinds of land. Theſe experiments demonſtrate the great advantage of the New Huſbandry, and will direct thoſe, who are deſirous to learn it, to the ſucceſsful practice; and this more particularly than they will find elſewhere in one view.

Thoſe who are deſirous to be informed of the practice of this huſbandry, as conducted by ſeveral ingenious perſons abroad, may conſult M. Duhamel's Huſbandry [a very curious French gentleman], who has collected their experiments, and publiſhed them together with his own; whereof ſome have been tranſlated into Engliſh, by the ingenious John Mills Eſq; and Mr. Miller author of the Gardeners Dictionary. Theſe experiments were numerous and accurate; but neither ſo extenſive, nor of near ſo long continuance, as theſe I have recited. And it is further to be obſerved, and will be obvious to thoſe who ſhall peruſe this treatiſe, that M. Duhamel and his

his correſpondents were not fully maſters of the New Huſbandry: as they were acquainted only with the firſt part of Mr. Tull's work; but had not ſeen the latter parts that he publiſhed afterwards, containing ſeveral improvements of importance, that he made in the courſe of his practice; yet were they ſo ſenſible of the advantages of his Huſbandry, and ſo much ſurpriſed at the effects of hoeing and good tillage, that many ſocieties have, in conſequence thereof, been eſtabliſhed in France, for the encouragement of agriculture; and theſe gentlemen have particularly recommended the New Huſbandry, which had ſucceeded with them much beyond their expectation, which they have very fully acknowledged.

The great advantage of this culture has been experienced, not only in Britain, Ireland, France, and Italy, but has been introduced likewiſe into America, whereof we have an inſtance from the ingenious Dr. Elliot of New England, in the culture of maize, there called Indian corn, which he relates as follows:

"The land," ſays he, "being previouſly "prepared, and the corn come up, we plough "a furrow off from the corn on each ſide, "and the next time plough up to the corn; "ſo that this tillage is nearly the ſame as is "propoſed for wheat, or whatever we would "plant: only, by the way, I would ob-"ſerve, that the ploughing between the "rows of Indian corn is ſo ſhallow, that "one

" one would be apt to think it intended for
" nothing more than merely to kill the graſs
" and weeds; whereas it is found by ex-
" perience, that, though there be neither
" graſs nor weeds, the ploughing and hoeing
" will make the corn grow; and that the
" more the land is ploughed and hoed, the
" better and longer it will reſiſt the drought,
" and yield the better crop: and, what is ſtill
" more remarkable, if the Indian corn be well
" tilled, the next crop, whether it be oats
" or flax, will be proportionably greater and
" better: ſo that the land muſt have gained
" ſtrength and richneſs. If it were not ſo,
" why did not the Indian crop exhauſt and
" and ſpend the ſtrength of the land, eſpe-
" cially when we conſider how large that
" corn is made to grow by good tillage? But
" we find the contrary; the better the crop
" of Indian corn, the better the crop will be
" of oats. There is no ſort of Huſbandry,
" wherein the ſuperior force and virtue of
" tillage doth more evidently appear, than
" in the raiſing of Indian corn: for if you
" ſhould plough and harrow the beſt land,
" and ſow or plant the corn, and never do
" any thing more to it, there will be leſs
" corn, than if you ſhould plant poor land,
" and cultivate it well: the poor land well
" ploughed and hoed ſhall bring a greater
" crop than the rich land. We hereby ſee
" the efficacy and advantage of this repeated

" tillage,

" tillage, which falls in ſucceſſively accord-
" ing to the exigency and want of the plant
" in its ſeveral degrees of growth; and keeps
" the land in a proper ſtate. Why ſhould it
" not have the ſame effect upon wheat, and
" every other plant, that is ſuſceptible of the
" like culture?"

Here it is to be obſerved, that maize or Indian corn is very generally cultivated in North America, and particularly in New England, where it is eſteemed to be a great impoveriſher of land; yet we ſee, that the Hoeing Huſbandry not only improves the crop, but the land alſo, to ſuch a degree, that it is ſo far from being impoveriſhed by this corn, as in their Common Huſbandry, that it is enriched ſo much by the hoeing, as to produce a better crop of maize, and likewiſe a better ſubſequent crop of oats or flax. This is the more extraordinary, as the hoeing was ſo ſhallow, and but once repeated; and ſhews, that ſucceſſive crops, even of this exhauſting plant, may be obtained in this Huſbandry; as we have ſhewn, that ſucceſſive crops of wheat have been obtained in Britain for a long courſe of years, though found impracticable in the Common Huſbandry. It is likewiſe juſtly obſerved here by the Doctor, that this culture may be applied with ſucceſs to other plants: for, " why," ſays he, " ſhould
" it not have the ſame effect upon wheat, and
" every other plant, that is ſuſceptible of the
" like

" like culture?" And, in fact, it is found to have the same effect upon wheat and other plants, upon beans, peaſe, cabbages, turnips, potatoes, carrots, &c. and, if properly applied, would have the ſame upon many others, as hops, madder, &c. and upon ſeveral plants, to great advantage, hitherto wholly appropriated to garden-culture; as I may hereafter have an opportunity of ſhewing.

It may indeed ſeem unaccountable to many, who are not well acquainted with this Huſbandry, that is has not made greater progreſs in Britain; which has been owing to ſeveral cauſes. It could not be expected that common farmers would come into it, till informed of the principles, and convinced of its utility, by the experience of gentlemen fully ſhewn them. It was oppoſed at firſt by ſome prejudiced perſons, who had an intereſt in ſo doing; and has been much prejudiced by ſeveral modern writers on Huſbandry, who neither underſtood it, nor had practiſed it with judgement and perſeverance. To ſhew how ſtrangely it was oppoſed may be ſeen in Mr. Miller's Gardeners Dictionary, under the article *Triticum*, where he ſays, that " the " Horſe-hoeing Huſbandry, which was prac- " tiſed by Mr. Tull, has been almoſt univer- " ſally rejected by farmers in every country, " it being ſo oppoſite to their accuſtomed " practice.—And indeed, by the abſurdity of " the author in a few particulars, he has diſ-

" couraged

" couraged many from engaging in it,—but, " upon finding Mr. Tull poſitively aſſerting, " that the ſame land would nouriſh the ſame " ſpecies of plants, without changing the " crops, for ever, and this without manure, " which, being contrary to all experience, " led them to believe his other principles had " no better foundation. And he practiſed " this method of ſowing the ſame ſpecies " upon the ſame ground, till his crops failed, " and were much worſe than thoſe of his " neighbours, who continued their old me- " thod of Huſbandry."

The practiſers of the New Huſbandry find, that manure is not in general neceſſary for wheat, even upon ordinary land, if well and ſufficiently hoed: for, if both well hoed, and alſo manured, the wheat would grow too rank and lodge. But, in cultivating turnips, cabbages, and ſuch as are intended for feeding cattle, manure is uſeful, and contributes to enlarge the crops to advantage, and without danger from their luxurancy.

Mr. Tull took the firſt hints of his Huſbandry, as he mentions himſelf, from the low vineyards in the ſouth of France, where the vines have been cultivated for ages by hoeing only, and without manure; which Mr. Miller had not well conſidered, or he could not have ſuppoſed a ſucceſſion of the ſame plants without manure, to be contrary to experience; and he too implicitly believed the

the reports induſtriouſly ſpread againſt this Huſbandry, and of Mr. Tull's ill ſucceſs, which was void of foundation, as he might have known upon enquiry. Yet Mr. Miller very much recommends the Hoeing Huſbandry, and gives inſtances of wheat-crops thereby obtained, much greater than any mentioned by Mr. Tull.

But notwithſtanding the vulgar prejudices againſt this huſbandry, it now gains ground, even among ſome farmers, who will undoubtedly adopt it more generally, as it is their intereſt to do, when made more fully acquainted with it, of which it is the intention of this treatiſe to inform them, and by what follows to render the practice of it eaſy and familiar to them, not only in the culture of wheat, but of many other plants.

The above experiments, and ſucceſsful practice of this huſbandry, will, it is preſumed, be acceptable to our readers; and they, who deſire to know the hiſtory and progreſs of it from the beginning, are referred to Mr. Tull's work above mentioned, whereof a new edition will ſoon be offered to the public.

A late writer, and favourer of the common huſbandry, has nevertheleſs owned, "that it "muſt be acknowledged, that even the Old "Huſbandry has received no ſmall improve-"ment by the diſcovery of the genuine prin-"ciples of the New. The advantages of "meliorating and pulverizing the earth are

" better underſtood, and I believe more ge-
" nerally practiſed than formerly; and the
" grand principle of all, that of frequently
" ſtirring, expoſing, and enlarging the ſuper-
" ficies, in order to ſuply in ſome meaſure
" the place of dung, is a diſcovery of vaſt im-
" portance.—And, ſays he, the memory of
" Mr. Tull ought to be held in the higheſt
" reverence by every huſbandman, for his
" improvement of the art of agriculture. It
" is from him we have learnt the great benefit
" of frequent plowings to pulverize the ſoil,
" which in ſome ſituations ſupply the place
" of dung. To him the farmer owes the ad-
" vantages ariſing from cleanſing and pre-
" paring his ground by ſowing turnips, and
" improving them by hoeing. It was Mr.
" Tull who firſt introduced the drilling of
" peas, beans, vetches, ſanfoin, &c. into field
" culture, and ſhewed the advantages of hoe-
" ing, and keeping them clear from weeds;
" and it is from him that the whole kingdom
" have learnt to raiſe more corn from leſs
" ſeed than ever was thought poſſible before
" he ſet the Example. Theſe are ſolid and
" ſubſtantial advantages, which have intro-
" duced an univerſal reform in huſbandry."

Theſe and other great advantages are owing to this great Huſbandman, who has raiſed a ſpirit of improvement upon a rational ſyſtem of agriculture, unknown to former ages. He has reſcued this moſt valuable art from the darkneſs

darkneſs and errors of ignorant ruſticks, and eſtabliſhed it upon ſuch clear principles, that thoſe of the firſt rank in his own and other countries of Europe are now convinced of its great utility, and are emulous to advance improvements, that before his time were neglected, or thought below the notice of gentlemen. Such is the merit of the Father of the New Huſbandry, whoſe memory deſerves to be celebrated, not only by the curious, but likewiſe that a ſtatue ſhould be erected for him by his grateful country.

APPENDIX.

IN the foregoing treatiſe, the methods of ſeveral eminent practiſers of the New Huſbandry are recited, which differing in ſeveral circumſtances may render this huſbandry obſcure to a beginner, eſpecially in cultivating wheat by the horſe-hoe. I have therefore added this Appendix, to guard him againſt miſtakes in that culture, and bring into one view the method that he may depend upon at his entering upon the practice.

The late Sir Digby Legard, who was an eminent huſbandman, and extenſive improver, near Scarborough in Yorkſhire, practiſed the New Huſbandry for eight or nine years, cultivating barley and wheat upon a field of ſeven acres: he likewiſe cultivated in other fields moſt of the other common plants in this method; for, beſides wheat and barley, he cultivated in that manner oats, beans, peaſe, turnips, potatoes, and lucerne; and communicated the reſult of his practice for a courſe of years in ſeveral letters to the London Society of Arts, and concludes his laſt letter, of the 12th of May 1768, with a recommendation of the drill and horſe-hoeing huſbandry, as follows, viz. "I "can ſay with truth, that, after ten years con- "ſtant and very extenſive practice, after the "experience of a great variety of ſoils and "ſeaſons,

" ſeaſons, I can recommend the drill and
" horſe-hoeing culture, as founded on reaſon
" and on truth. I have conſtantly attended, with
" all the impartiality I am maſter of, to the
" peculiar advantages, inconveniencies, ex-
" pences, and benefits, both of the Old and
" New Huſbandry, and I cannot avoid giving
" my verdict in favour of the latter."

He had before given his opinion, with regard to the farmers practiſing this huſbandry, in the following judicious manner. " That the
" old method, ſays he, with aſſiſtance of the
" more modern improvements, by turnips and
" clover, and by the alternate uſe of the le-
" guminous plants, which require hand-hoeing,
" is very advantageous, I allow. Perhaps the
" farmer, who purſues this method in its
" greateſt perfection, judges wiſely, in pre-
" ferring a ſyſtem he is maſter of, and can
" confide in, to another, whoſe principles may
" be juſt, but the practice of which is totally
" different from his own. But the farmer,
" who is ignorant of theſe modern improve-
" ments, ſurely ought not to heſitate to adopt
" the drill culture, which a few years prac-
" tice would render habitual, and which he
" would find to be much more beneficial. For
" it is certain, that this is leſs expenſive than
" the old method, and, when once adopted,
" eaſier in the execution."

This culture has made hitherto but a ſlow progreſs; the great farmers cannot adopt it in

general, as their ſervants are not acquainted with it: but the little farmers might more eaſily come into it; they do great part of the huſbandry work themſelves, and the whole is under their immediate direction; ſo that, after they have attained to the knowledge of it, they could eaſily put it in practice; and the little farmers in the neighbourhood would readily adopt it likewiſe, for it is not only more eaſily performed, but it is likewiſe more profitable than the common huſbandry.

Suppoſe, for example, ſuch a farmer rents nearly 80 acres of land, for which he pays 50 *l.* a year; it has been uſual to reckon, that a farmer ought to make three rents, one for his landlord, one to pay the expences neceſſary to be laid out upon the farm, and the remaining third to pay the expences of houſe-keeping, &c. and to ſave ſome for his family. But, as this has been the general eſtimate a long time, and before clover became ſo general, and the hoeing culture of turnips ſo well underſtood as it is now; likewiſe before the modern practice, of the moſt ſkilful farmers, of introducing hoed crops of beans, peaſe, cabbages, &c. inſtead of a fallow, whereby the expence of fallowing every third or fourth year is ſaved, and a hoed crop obtained every fallow year; theſe are ſo great improvements in the common huſbandry, that now it is reckoned the farmers make a greater profit of their arable lands than three rents; and

ſome have reckoned it ſo high as four rents; which it may be in ſome particular caſes and ſituations, though in general not ſo high.

This profit includes all that is made from the crops of corn and graſs, cattle, dairy, hogs, poultry, and every other produce of the farm; for, with regard to the crops of corn, and other vegetables generally cultivated, they fall much ſhort of theſe eſtimates.

Sir Digby Legard, being fully ſatisfied of the advantage of the New Huſbandry, from experience, compares the ſame with the common Huſbandry; obſerving, that a letter in the 3d volume of the Muſeum Ruſticum, p. 232, ſigned Y, reckons the clear profit of land in tillage, near Bury in Suffolk, at about 15 s. per acre. He then gives the courſe of huſbandry frequently obſerved by farmers in his neighbourhood, where the fields are incloſed, and let for fifteen ſhillings an acre, tithe-free; the courſe for four years being, firſt year turnips, ſecond barley, third clover, and fourth wheat. The total produce in four years is 12 *l.* 18 *s.* and the total expences in four years is 8 *l.* 6 *s.* 6 *d.* and the clear profit of an acre in that time 4 *l.* 3 *s.* 6 *d.* or near a guinea an acre clear profit a year. Whereas the clear profit a year, upon the acre cultivated by himſelf in the New Huſbandry, is 1 *l.* 18 *s.* 0 *d.*; where it is to be obſerved, that he reckons the profit of the New Huſbandry, from barley cultivated in that method; which he acknowledges is not ſo pro-

ſitable as wheat ſo cultivated, alſo that he had ſuppoſed the fourth crop in the old way to be wheat; whereas, ſays he, "it is much "more common hereabouts, where the land is "not perfectly adapted to the culture of wheat, "for the farmer to ſow oats, or ſome other "ſpring crop, after the clover; and thus is "the profit reduced," of the common Huſbandry in that neigbourhood. But he proceeds to compare his barley crops in the New Huſbandry with an eſtimate in the foreign eſſays on huſbandry, p. 322. where M. De L'Harpe eſtimates the clear profit of one acre in Swiſſerland at one pound ſeventeen ſhillings; this is from crops of ſainfoin and clover, with intermediate crops of corn; which, Sir Digby ſays, is certainly the higheſt calculation of any he ever met with; yet even that is not ſo profitable as Sir Digby's barley crops in the New Huſbandry, and would be ſtill more inferior to his wheat crops cultivated in that manner. It is likewiſe to be obſerved that this calculation of M. De L'Harpe is upon a ſuppoſition that only half the land is under corn, and the other half is every year clover and ſainfoin, which is a large proportion of the land in cultivated graſſes, beſides meadow and paſture.

Sir Digby was ſo far from being partial in favour of the New Huſbandy, that, as he writes in his firſt letter to the London Society, "I "am the more inclined to communicate to you "theſe experiments of laſt year, becauſe I think

" the compariſon leſs favourable to the New " Huſbandry in that than any other years " wherein I have made experiments. For I " would allow every advantage to old cuſtoms, " that they can naturally or reaſonably claim." And, agreeably to this, he reckons the profit of his horſe-hoed crops as above, not according to thoſe crops that he obtained after he had experience in that method of Huſbandry, but his firſt crops are alſo included, though much inferior to thoſe he had afterwards from the ſame land: for he committed ſeveral errors at firſt, as he frequently mentions: " My former " experiments, ſays he, began in 1763, and " ended in 1765, and they were confined to " the culture of barley. But, I think, it will " ſet the advantages of the horſe-hoeing, or " Tullian Huſbandry, in a clearer light, if I " give you the produce of the ſame field, " cultivated during eight ſucceſſive years (in- " cluding the three I before gave you an ac- " count of), according to the principles of " the New Huſbandry, without dung, or any " other amelioration but what the plough " alone has obtained. In communicating to " you my firſt attempts, I am ſenſible, that " my inexperience will appear to be the cauſe " of much loſs. Nevertheleſs, my errors may " ſerve as leſſons to others; and, in calcu- " lating the profit of a certain portion of land, " at a medium of eight years, as I include the " firſt and leaſt profitable ones, I ſhall be ſcarcely

" ſuſpected of any prejudice in favour of the " horſe-hoeing ſyſtem."

Sir Digby cannot indeed be charged with any partiality in this reſpect, and without doubt his ſtating the errors of his firſt practice of this Huſbandry was giving a fair and candid account of his ſucceſs; yet, in a comparative view of the Old and New Huſbandry, it is much to the diſadvantage of the New, to include theſe imperfect beginnings; for, as the Old Huſbandry is ſtated in the beſt and moſt approved methods of that huſbandry, the beſt method in the New ſhould likewiſe be ſtated, the errors having been ſeen and rectified in the future practice of it. " This field, ſays he, " (the ſeven experiment acres) has never been " manured, as I obſerved before, ſince my " experiments were begun, nor for many " years preceding. It may be remarked, that " that the firſt crops were not the beſt; but, " on the contrary, a regular improvement for " ſome years kept pace with its cultivation, and " the value of the four laſt crops is almoſt " double to the former ones. The greateſt " fault committed at firſt was the ſowing " too little ſeed. The land ſeems yet in per- " fect heart, and though the product of laſt " year was leſs than in former ones, it was " well known that the wheat crop failed all " over England."

By this it appears, that, by a few years practice, this method of Huſbandry was ſo much improved,

improved, ſo well attained to, that the profit was almoſt doubled in four years; and therefore the crops of the firſt four years, before the method was well underſtood and practiſed, ſhould not be included in a comparative example of theſe two methods of Huſbandry, where one was ſo imperfectly practiſed, and the other performed in the beſt manner; and an impartial compariſon of both, where both are well performed, is ſtill more in favour of the New Huſbandry, than appears in the above ſtate of them.

There is likewiſe another circumſtance, greatly in favour of the New Huſbandry, ariſing from another error in the practice of this gentleman; for Mr. Tull, the author of this Huſbandry, in his firſt practice of it, gave his wheat ſix horſe-hoeings, beſides once plowing the land, to form it into ridges before the ſeed was drilled; and he recommends ſix horſe-hoeings as neceſſary: this was when he drilled wheat in two, three, or four rows, upon ſix-feet ridges; but upon further experience he found that narrower ridges, viz. thoſe of four feet eight or nine inches broad, and only two rows of wheat upon each ridge ten inches aſſunder, was better than the ſix-feet ridges with more than two rows; and alſo, that four horſe-hoeings of theſe narrower ridges, and deeper hand-hoeing between the double ten-inch rows, produced him as good or better crops, and at a leſs expence, than the ſix-feet ridges;

ridges; the practiſers therefore of this huſbandry have adopted his latter method in the breadth of their ridges, and number of horſe-hoeings. Sir Digby takes notice that four horſe-hoeings were the number proper to be given to a hoed crop of wheat: "After the firſt "year, ſays he, that is, when the land is re-"duced into fine order, one horſe is generally "ſufficient to turn a furrow either to or from "the rows: and as a man and horſe can with "eaſe horſe-hoe four acres in a day, it can-"not coſt more than one ſhilling to hoe an "acre, even including the repairs of the in-"ſtruments; nor are more than *four* hoeings "commonly required. So, if we reckon four "ſhillings for ploughing the ground *once over*, "or forming freſh ridges, four ſhillings more "for horſe-hoeing, two ſhillings and ſix-pence "for hand-hoeing, two ſhillings for weeding, "and ſix-pence for drilling, thirteen ſhillings "is the whole expence of managing an acre "in the new method. Such therefore being "the caſe with which this celebrated me-"thod is performed, ſo great the improve-"ment of the land by it, and ſuch the ex-"traordinary effects produced by merely ſtir-"ring the earth; one would think every huſ-"bandman ſhould be induced to give a fair "and candid trial."

Here Sir Digby ſtates the proper tillage at once plowing, to form the new ridges, and four horſe-hoeings afterwards, which are agree-

able

able to Mr. Tull's lateſt practice and direction; yet it appears from Sir Digby's account of his tillage, that, in forming the new ridges, he ploughed the land twice, and gave it afterwards but three horſe-hoeings. It does not appear why he thus deviated from Mr. Tull's practice and directions; but it ſeems pretty evident that this deviation was the cauſe of leſſening the crops: for Sir Digby, deſcribing the quality of his land, ſays, "the ſoil is "light, deep, and dry, a hazle mould, excel-"lent for barley, but generally thought not "of ſufficient tenacity for wheat, and worth "in this neighbourhod fifteen ſhillings per "acre, tithe-free."—Not of ſufficient tenacity for wheat, this was the opinion of the farmers there, who were probably right in their opinion concerning this land, as cultivated in the Old Huſbandry; but in the New it was otherwiſe: land is ſeldom too dry for wheat, if well and frequently horſe-hoed; for that pulverizes the land, and opens it to admit the dews, which keep it moiſt, an advantage it has not in the Old Huſbandry. Sir Digby ſays, "wheat, barley, or oats, have uſually yielded "me a third more from random ſowing, than "if drilled and hoſe-hoed; that is, if three "quarters may be produced from one acre in "the common Huſbandry, the ſame ground "will, *cæteris paribus*, produce no more than "two quarters when drilled and horſe-hoed." He ſays, he had ſome years two quarters of wheat

wheat (nine gallons to the buſhel) per acre drilled and horſe-hoed; but that he judged, "that twelve buſhels of wheat upon an acre "is about the medium quantity to be obtained "from moderately fertile ground, during at "leaſt ſix ſucceſſive years, without dung. Now, "if this be a true poſition, I think it will "not be difficult to prove, that the drill cul-"ture is more beneficial to the farmer, than "any other method hitherto invented."

Sir Digby is undoubtedly right, that twelve-buſhels per acre is very profitable to the farmer, who can obtain ſo much from moderately fertile ground without any manure, as in this inſtance; but much more may be obtained per acre in ſuch land, by the New Huſbandry, than twelve buſhels of wheat; and from thence we may conclude with certainty, that there was an error in his culture of wheat by the New Huſbandry.

To ſhew this, it might be ſufficient to refer to Mr. Tull's ſucceſs, who had commonly much more than twelve buſhels of wheat per acre from land that could not be properly called moderately fertile ground, but was really poor ground, as deſcribed by himſelf, and by others who viewed it on purpoſe to know the quality of his land, which lying on chalk is very dry, and, beſides its poverty in quality, is alſo moſt of it a ſhallow ſoil, ſo that it appears to be much inferior to Sir Digby Legard's land, upon which he culti-

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vated barley and wheat by the New Huſbandry: yet Mr. Tull, by an actual trial, had near four quarters, or thirty-two buſhels (nine-gallon meaſure), of wheat per acre upon his beſt land; and upon about eighty acres, he had near twenty buſhels of wheat per acre upon an average, of his ordinary land, moſt of it inferior to Sir Digby's ſeven experiment acres. Others have ſince had nearly as good crops of wheat in the hoeing culture, as have been obtained the ſame years in the neighbourhood in the Old Huſbandry, where the land has been of equal goodneſs, and the hoeing culture ſkillfully performed, in the manner directed by Mr. Tull, and according to his lateſt practice.

The reaſon that Sir Digby did not obtain better crops of wheat in the New Huſbandry was his giving his wheat but three horſe-hoeings, and one of them a very ſhallow one, inſtead of four deep horſe-hoeings: for no novice in this Huſbandry ſhould beſtow fewer hoeings than Mr. Tull gave and directed, but rather more, and as deep and near to the plants as he did, for he was perfect maſter of the New Huſbandry particularly in the culture of wheat. The wheat plants, when upon tolerable land, branch much when well horſe-hoed, and for that reaſon three pecks of ſeed wheat is generally ſufficient to drill: neither Mr. Tull, nor any of the moſt expert cultivators drill more, even if the ſeed is planted late; but if planted

planted early in the ſeaſon, and upon good land, about two or between two and three pecks is found enough. If more is drilled, the wheat being too thick is apt to lodge; and hence likewiſe appears a defect in Sir Digby's method of hoeing; for he drilled a buſhel of wheat upon an acre, which was certainly too much upon ſuch good land, if the culture had been performed in the beſt manner: for then his wheat would have been apt to lodge.

What has been ſaid with regard to Sir Digby's culture of wheat, is not by any means intended to depreciate that gentleman's practice of agriculture, who was an excellent huſbandman; but to guard the farmer from falling into an error which he might be led into from a miſtake of that eminent cultivator. And if, as he has ſhewn, twelve buſhels an acre is more profitable than the Old Huſbandry, how much greater muſt the farmer's profit be, who can raiſe from ſixteen to twenty buſhels an acre, from ordinary land, without manure, and at the expence of only fifteen ſhillings an acre, for the culture beſtowed upon it in the New Huſbandry? And that, upon good wheat land, he may, in that Huſbandry, raiſe from twenty to thirty buſhels and upwards per acre, without the expence of manure, and with very little more expence of culture than in ordinary land?

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The little farmers, having but ſmall capitals to begin farming, muſt be content with ſmall farms; and it is of great conſequence to them, to obtain ſuch as do not require much money to ſtock them. In this reſpect the New Huſbandry is peculiarly ſuitable to them, as that requires much leſs ſtock than the common huſbandry, which, for a farm of fifty pounds a year, may require four or five horſes to cultivate it. Theſe are a heavy expence upon them; horſes being very expenſive to keep: for which reaſon many of them find it neceſſary to employ their horſes in carrying timber, ſtone, or other articles, for hire, and to bring dung or other manure for their land, though ſeveral miles diſtant, which employs themſelves and horſes a conſiderable part of their time: and the article of manure in particular is ſo indiſpenſably neceſſary, that, without a large quantity of it, many ſuppoſe that no ſucceſs can be expected in farming, and to procure enough of it becomes a heavy expence upon the poor farmers in particular. This is a matter of great importance, as the little farmers are extremely uſeful to the community in many reſpects; and a method of culture, that will be greatly aſſiſting to them, is on that account particularly valuable.

It may ſeem incredible to many, that the New Huſbandry can be carried on at a leſs expence than the Old. The neceſſity of ſo much hoeing, of men and cattle often in the

field at work, after the work in the Old Husbandry is finished, has made many conclude, who are unacquainted with the New Husbandry, that the tillage is much more expensive in the New than in the Old; and several modern authors have supposed it so, and others have roundly asserted it, though entirely contrary to fact and experience, and though it plainly appears that they neither had experience in this husbandry, nor understood the principles of it.

But admitting that, in a course of crops in the common husbandry, the land is ploughed twice only for each crop at an average; and that each successive wheat-crop in the hoeing-culture requires also twice ploughing, once to form the new ridges, and four horse-hoeings afterwards, which are equal to another ploughing; the whole tillage in the new way does not exceed, in labour and expence, two common level-ploughings of the land, which is therefore nearly equal to the tillage usually given to land in the old way: and thus the tillage may seem equal in both methods; but is really very different, because the land in the New Husbandry, if properly cultivated, is always in high tilth, kept loose, light, and open, by the repeated hoeings; so that half the strength of cattle is sufficient to till such land as the farmers use in common ploughing: for, if the land is strong, and usually ploughed with four horses, two such horses are

are ſufficient to till the ſame land in the hoeing huſbandry; and in light land, which is ploughed with two horſes, it is hoed with one: and thus in general the hoeing huſbandry is performed with about half the ſtrength, or half the number of the ſame horſes that are commonly employed to plough the ſame land; which greatly reduces the price of the hoeing tillage.

In the common huſbandry, a ploughman, driver, and four horſes, uſually plough an acre of land a day; but in the New Huſbandry for wheat, a ploughman horſe-hoes four acres a day with two horſes without a driver. Sir Digby Legard uſually ploughed four acres a day of his light land with one horſe.

There is, beſides, another ſaving in this reſpect; a ploughman and driver is commonly employed with every plough team, of three or more horſes, in the uſual way of ploughing land; but in the hoeing-huſbandry a driver is not neceſſary: for in the New Huſbandry, wheat is drilled upon ridges (being much better than upon level ground, more conveniently horſe-hoed, and keeping the wheat dry in the winter); and cattle, horſes, or oxen, after a very little uſe, are very tractable in hoeing, being guided by the ridges to go ſtraight without a driver. The ſaving in this reſpect, and only half the number of cattle employed in hoeing as in common ploughing, renders the tillage a great deal cheaper in the New, than in the Old Huſbandry.

Some of the practiſers of the New Huſbandry having, as we have ſeen, deviated from the moſt ſucceſsful method, and ſome of thoſe who oppoſe or do not underſtand it having obſcured it; a farmer, who is deſirous of practiſing this huſbandry, may be at a loſs to know the beſt method, and upon which he can rely: the following deſcription may therefore be of uſe to ſuch, and is offered to thoſe who deſire to practiſe it with ſucceſs, particularly in the culture of the wheat, which is the farmer's principal crop; and thoſe who can cultivate wheat well in the hoeing huſbandry, may ſoon attain to the beſt culture of other crops in the ſame manner.

The farmer is adviſed to begin at firſt with a ſmall extent of ground; an acre or two laid up in ridges to be horſe-hoed, about the ſame quantity to be drilled in equidiſtant rows upon level ground, and another piece to be ſown broad-caſt; all theſe pieces of land to be contiguous to each other, to be as near as poſſible of the ſame quality, and ſown at the ſame time, and with the ſame ſeed: theſe different methods will not only be amuſing, but of real uſe to the cultivator.

It may be proper to winter and ſummer fallow the whole, and is the beſt method of extirpating the weeds, and making the land very clean; this is abſolutely neceſſary for the piece to be horſe-hoed, for that muſt be made very clean, and brought into good tilth, before it

it is drilled with wheat. If this is omitted at firſt, it cannot be made clean nor kept ſo afterwards but at a great expence, eſpecially land that is ſowed with a double row, for it will be extremely difficult to get the weeds and natural graſs out of a double row of wheat.—The beſt way of fallowing, is to lay the land up at firſt in high narrow one-bout ridges. By laying the land up in this manner, it is expoſed to the immediate influences of the weather, and is eaſily ploughed, and at a ſmall expence, at one bout; or a double mould-board plough will ſplit theſe narrow ridges in the middle at one draught, and form new ridges. If they are harrowed down level between the ploughings, the weeds will ſoon come up; and being ploughed again into theſe narrow ridges, to remain ſo a few weeks, and alternately ploughed down and harrowed fine, the land may be thus expoſed to the atmoſphere, the weeds harrowed out, and the young weeds deſtroyed; by which means the land will alſo be brought into fine tilth in a winter and ſummer; nor will the expence be ſo great in this as in the common way of fallowing, but much more effectual for the purpoſes intended. —The land for theſe trials ſhould be of a middling quality, not very rich, nor poor. The ploughings ſhould be performed when the land is dry; and no dung ſhould be laid upon it, nor any other manure,

When the ridges are leveled the laſt time, harrow the land fine, the contrary way to the intended bearing of the ridges to be horſe-hoed; then with a pair of light narrow wheels, ſet to the diſtance of the ridges (as of four feet ten inches), mark the breadth of the ridges; which the wheels will plainly do, if drawn acroſs the harrowing: the marks will guide the ploughman to make the ridges of that breadth, and very ſtraight, which they ſhould be made. Ridges of the common height are proper to be drilled; but in very ſtrong land they ſhould be laid up high, to throw off the rain water, and keep the wheat dry, which is neceſſary. Ridges of four feet ten inches broad give room to drill a double row of wheat at ten inches diſtance upon the middle of each ridge (called the partitions), and intervals of four feet between the double rows, to be horſe-hoed, four feet being a proper diſtance, and room for the hoe-plough to work and turn the earth to or from the rows.

The tops of the ridges ſhould be ſmoothed with light harrows before the wheat is drilled; and the horſe or horſes that draw the harrows ſhould walk in the furrows between the ridges.

The farmer, who intends to practiſe the hoeing huſbandry, ſhould have a drill-plough to ſow the ſeed, for that is the moſt exact way of doing it. Sir Digby Legard had Mr. Tull's

Tull's drill-plough made with wooden ſeed-boxes, which performed well, and coſt fifty ſhillings. But if he has not a drill-plough at firſt, he may mark two parallel channels upon the top of each ridge very ſtraight, and upon the middle of each ridge, and ten inches diſtant. The drill-plough makes the channels, drills the ſeed (about three pecks to an acre), and covers it about two inches deep, all at one operation; but, if there is no drill plough, the ſeed may be ſprained thin into the channels by hand, and covered with a rake or light ſhort-toothed harrow, about the ſame depth, two inches; and when the wheat comes up, and probably will be too thick, the plants ſhould be thinned to about an inch diſtance, with a very narrow ſharp hand-hoe; but it is much the beſt way to do this by hand, and as regularly as can be done.

It is uſual to brine and lime ſeed-wheat, to prevent the crop being ſmutty, which ſome years it is very apt to be, and to damage the crop. If the ſeed is very clean, ſound, and from a good change, it will not produce a ſmutty crop: but brining is the ſureſt way to prevent it. Full plump wheat is the moſt apt to produce a ſmutty crop: for which reaſon, farmers prefer thin ſmall-bodied wheat for ſeed, particularly the burn-beat wheat. The ſmall ſeed, if ſound, produces as full-bodied wheat as any: for the crop is not large-grained wheat from the ſize of the ſeed, but from the goodneſs of the land, and the tillage.

The intervals ſhould be horſe-hoed in November or December, before the froſt ſets in, and the earth ploughed away from the rows of wheat; the hoe-plough to be brought within about three inches of the rows: if any earth runs over the left ſide of the plough upon the rows, the wheat muſt be uncovered; but where it runs only upon the three-inch narrow ſlips, it ſhould remain there till the next hoeing in the ſpring; for the fine earth which falls upon theſe ſlips will give ſhelter to the wheat in winter.

The ſecond hoeing is to be given the beginning of March, or as ſoon as the great froſts are gone off. The hoe-plough is, at this hoeing, to go in the ſame furrows as it did at the firſt hoeing, but deeper and nearer to the wheat: this looſens the earth next the wheat, and, the furrows being at the ſame time made deeper, gives the roots of the wheat liberty to extend every way, the effect of which will be ſoon viſible: the wheat will grow more luxuriant, and of a deep green colour. The plough ſhould at this ſecond hoeing go deep and very near the rows of wheat, and cannot be brought too near, ſo as it does not diſplace or tear out the plants. Several, who have practiſed this Huſbandry, have been afraid to hoe ſo cloſe to the rows, leſt the wheat ſhould be injured by the plough breaking or tearing off the roots of the wheat: but this is a great error. Hoeing ſo cloſe does not injure the wheat; but is

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a great benefit to it, breaking off the ends of the roots, cauſes new roots to ſpring out at the broken ends in much greater numbers than before, and theſe young roots being porous abſorb more vegetable nouriſhment, ſo that the plants are fed more plentifully. The earth is likewiſe by the deep ploughing opened and made penetrable to the roots, to a greater depth than it was before; and the bank next the rows left there at the firſt hoeing, being hardened by the weather in winter, confines the roots that they cannot ſo eaſily ſpread and extend ſide-ways till that cruſt of earth is removed by the plough; which, when the earth is in a fit temper for this hoeing, may be done near the rows, even within about an inch of them, eſpecially if care has been taken to drill the rows very ſtraight, and upon the middle of the ridges.

In about ten days or a fortnight after this hoeing, the earth is to be hoed back to the rows; but if the mould ſhould be ſo crumbly and dry as to fall down, and expoſe the plants too much, the earth ſhould be immediately hoed back to the rows to ſupport them, and the earth being now all well tilled and looſened next to the rows, the roots will freely ſpread and extend therein; and though ſome may doubt the cauſe, none can diſbelieve the benefit and effects of theſe hoeings, who may ſee, in a ſhort time after they are performed, that the wheat will grow remarkably luxuriant,

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and of a healthy deep-green colour, in conſequence of them.

The partitions or narrow ten-inch ſpaces between the too rows of wheat, ſhould be well and deeply hand-hoed, and alſo the narrow ſlips on the outſides of the rows; which may be done before the intervals are horſe-hoed, or before the earth is turned back to the rows, according as the weeds are more or leſs advanced; and at the ſame time the weeds and natural graſs ſhould be carefully drawn up out of the rows by hand. Once hand-hoeing the partitions is generally ſufficient to keep down the weeds, and the wheat growing up and ſpindling ſhades the weeds ſo much, that they cannot make much progreſs afterwards. It is, however, a matter of importance to keep the land very clean, and that the weeds ſhould never grow up high, much leſs ſhould they ever be ſuffered to run to ſeed; to prevent this, it may be adviſeable, when weeds grow faſt, to give the partitions a ſecond deep hand-hoeing, with a common hand-hoe, and another hand-weeding of the partitions, and the narrow ſlips may be hoed with a Dutch hoe, which is called ſcuffling, and kills the weeds by cutting them off near the ſurface of the ground.—A ſecond hand-hoeing is of more advantage to the crop and to the land than the expence of it, and particularly if deeply hand-hoed, for that looſens, turns, and improves the ground betwixt the rows, which has no other aſſiſtance during the growth of the crop; but the intervals between

tween the double rows have the benefit of hoe-ploughing, which improves the land, and ſubdues the weeds there.

The time to give the third hoeing is not limited; only the farmer ſhould be careful not omit hoeing till the earth becomes ſtale and hard, and till the weeds get a head and grow luxuriant. It is likewiſe neceſſary to obſerve the ſtate of the land; that it be dry, and will break into fine parts by the hoeing, which ſhould not be done when the earth is wet. A good horſe-hoeing is very ſerviceable when the wheat begins to bloſſom, or a little before; for this ſtrengthens the plants and bloſſoms, ſo that they produce more grain than if not aſſiſted at this critical time: for ears of wheat are formed at firſt to produce above double the number of grains that are found in them afterwards; as may be ſeen, if examined, when they begin to blow, either by the eye, or better by a magnifying glaſs; and by this examination it will be plainly ſeen that more than half the bloſſoms are abortive for want of nouriſhment, and that this happens even after the grains begin to be formed: it is therefore of great importance to aſſiſt the plants by a good and deep horſe-hoeing when they begin, or a little before they begin, to blow. It is not neceſſary that this hoeing ſhould be performed by turning the earth towards the rows, for the plants are nouriſhed by turning the earth to or from the plants, as we ſhall ſee below.—

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The horſe-hoeing is neceſſary at this time for another reaſon, viz. that, in ſome years and in ſome climates, the weather may become rough and boiſterous after Midſummer, and when the wheat-ears become heavy; for then the ſtraws bend, and are ſometimes ſo diſordered, that the wheat cannot then be ſafely horſe-hoed, and its miſſing of a hoeing then will be an injury to the crop and to the land; but this will not be ſo injurious, if it has been well hoed at the time of its beginning to bloſſom.

If the earth is ploughed from the rows at bloſſoming, the hoe-plough ſhould go cloſe to the rows, as cloſe as at the ſecond hoeing: this may ſeem too near, and ſo Mr. Tull himſelf thought at firſt; but, upon further experience, he found that his wheat throve the better for bringing the hoe-plough cloſe to the wheat at every hoeing from the rows.—The third hoeing, given when the wheat begins to blow, will be of great ſervice, in cauſing the ears to produce a greater number of grains. —And if the wheat ſtands fair, the next hoeing after the wheat has done bloſſoming will alſo be very ſerviceable, to nouriſh the wheat well then, and cauſing the grain to be large, plump, and full of flour.

It was before obſerved, that Mr. Tull's lateſt practice was, to give his wheat four horſe-hoeings: the firſt was before winter from the wheat; the ſecond was in the ſpring alſo from the wheat, only deeper, and nearer to it; the third

third hoeing was to fill the grain, turning the earth towards the rows; and the fourth and laſt hoeing turned the earth from the wheat, and the hoe-plough was then brought cloſe to the rows, as cloſe as at the ſecond or ſpring hoeing.—It is very remarkable, that ploughing the earth away from the wheat while it was ripening ſhould then nouriſh and ripen it; but he was very clear, from full experience, that it did ſo; and I have ſeen wheat hoed in this manner with ſucceſs, the earth ploughed away from the wheat and remaining ſo till harveſt. It is not, however, neceſſary to hoe the earth from the rows the laſt time, and in general it is not ſo convenient as turning the earth towards the rows at the laſt hoeing; becauſe, if the next crop of wheat is drilled upon the former intervals, as is commonly done, more ploughing is neceſſary to form the new ridges; for which reaſon I would adviſe the young farmer to hoe the earth the laſt time towards the wheat, and in this way he will hoe three times from the rows, and twice towards them, which may be called five hoeings; but the ſecond or ſpring hoeing from the rows, being only to deepen the winter furrows, and bring the hoe-plough about two inches nearer to them, is not properly a full-hoeing; and, not reckoning that, the whole is only four hoeings. —I am ſenſible that the ſpring hoeing from the rows is uſually reckoned; but the great error of thoſe who have tried this Huſbandry unſucceſsfully

ceſsfully, having been their hoeing too ſuperficially, and giving but three inſtead of four or more hoeings, the Farmer, when he begins this Huſbandry for wheat, ſhould give it five hoeings as above; and when he has experience in the practice, and finds his land in order for it, he may then abate one hoeing: however, even if five hoeings were continued, the expence of one hoeing is but a trifle and will be no loſs, for the wheat will tiller or branch more, and the leſs ſeed will do.

From the beginning of March to about Midſummer is the principal time for the ſpring and ſummer hoeings; which being liable to be obſtructed by accidents of rainy and rough weather, the farmer ſhould not omit the proper opportunities of performing them about once a month when the earth is dry; their not attending to this has been the cauſe of ſeveral beginners not ſucceding well, for there is no loſs in often hoeing, but an advantage both in the crop and land; and after the land is brought into good tilth, once or twice hoeing extraordinary coſts but a trifle; and is no damage, unleſs they make the corn too luxuriant, which happens moſt commonly by ſowing too much ſeed, or the plants ſtanding too cloſe.

It is not eaſy to determine the moſt proper quantity of ſeed; for if drilled too thick, or it branches very much, it will be apt to lodge, for the ſame reaſon that wheat ſown broad-caſt is apt to do

do ſo; namely, its ſtanding ſo thick as to exclude the air and ſun from the roots and ſtems, whereby the ſtems become weak and ſpungy, unable to ſtand upright againſt wind and rain, and fall down to the ground before they are loaded with the weight of the ears, and even before the ears are filled with grain; but, if the drilled wheat is not too thick, it will generally ſtand and the ears not touch the ground, though by their weight they hang down and bend the ſtraw that ſupports them in a manner not common to any other but the horſe-hoed wheat; the diſtance to which the plants are to be thinned at firſt depends upon the quality of the land and the hoeing.

Brining and liming the ſeed is uſeful, to prevent the ſmut, but is attended with one inconveniency, that the land ſhould be moiſt when ſown or drilled; for ſteeping the ſeed, eſpecially if done as frequently directed for many hours, cauſes the corn to ſwell and imbibe ſo much moiſture that a vegetation commences; and if then ſown in dry earth, and no rain falls ſoon, the vegetation is checked, which kills or much weakens the ſeed. Other ſeeds in general, both in farming and gardening, are ſown when the earth is dry; and the reaſon that wheat is an exception to this, is its being ſo long ſteeped in brine; for which, however, there is no neceſſity, for it is the ſmutty powder adhering to the ſeed-corn that cauſes the crop to be ſmutty. If no ſuch

powder

powder adheres to the ſeed, the crop is generally free from ſmut; or if the ſmutty powder is waſhed off the ſeed by briſkly ſtirring it with a ſtick in fair water only, and all the ſmutty powder ſkimmed off the top of the water, this will prevent the ſmut, as has been found by experience, and the ſmutty powder is by the ſame means ſtill more eaſily ſeparated from the corn if it is briſkly ſtirred among brine and well ſkimmed; in either way, there is no neceſſity to let the ſeed lie ſoaking any time, but may be taken out of the liquor and dried, and ſown immediately after it is dry, which is much better than ſowing it wet, and if the ſeed is from a good change and free from ſmut, it may be ſown without being ſteeped at all and while the land is dry, it then is not forced, but vegetates gradually and according to the order of nature.

If the crop ſhould happen to be ſmutty by very unkind ſeaſons or otherwiſe, it is a damage to the crop, and leſſens its value at market, and for this the farmer has no remedy when ſown broad-caſt; but when the ſeed is drilled, the crop may be intirely cleared of the ſmutted corn before it is reaped. For horſe-hoed wheat, having large ears, full of heavy grain, bends and turns downwards before harveſt; but the ſmutty or blighted ears, being light, ſtand upright, and are eaſily diſtinguiſhed, and may then be all clipped off by a woman, and carried away in a bag at a trifling expence;

expence; the crop being thus freed from ſmut, will ſell at a full price, being as fit to make bread as any other, only not ſo proper for ſeed to be ſown without being waſhed in brine, as ſome of the ſmutty powder may have been blown upon the ſound corn before the ſmutty ears were cut off.

There is a great advantage in keeping all crops clean from weeds, and particularly hoed wheat crops; for horſe-hoed wheat, being ſupplied with abundance of nouriſhment till it is fully ripened, is uſually ſeveral days later in ripening than ſown wheat, for which reaſon it is adviſeable to drill wheat early, as ſuppoſe in the beginning or by the middle of September, for by that means it will be the ſooner ripe. Some ſeaſons are early, and ſome ſo late, that it may not be proper to drill ſo early as the beginning of September; but when the weather is ſuitable and the land in order, it is moſt adviſeable, to drill early; the early ſown has another advantage beſides its ripening early, it tillers or branches before ſpring; and its roots being thus multiplied, it is the better able to reſiſt the cold and froſt in winter.

Many farmers, however, do not chooſe to ſow early, becauſe they ſay the wheat grows winter-proud, that is, ſhoots up before winter ſo luxuriantly, that the plants are liable to be killed by the froſt; but though the blades are ſometimes killed, yet the roots ſurvive (if the land is dry and healthy), and they produce

new and ſtrong ſhoots after the froſts are over, as has been frequently obſerved, and produce a good crop; whereas, if the wheat has but few and weak roots, it is liable to be totally deſtroyed by great froſts. In the long and ſevere froſt in the year 1740, much of the wheat above ground was killed; and many farmers, thinking their wheat was wholly deſtroyed, ploughed it up, and ſowed the land with ſpring corn; but others, finding upon examination that the roots of the wheat was alive, ſuffered it to remain, and it ſhot up again, and in many places produced great crops.

A remarkable inſtance of this is mentioned by Mr. Tull, p. 262. "It happened once, "ſays he, that my *white cone* being planted "early, and being very high, the blade and "ſtalk were killed in the winter; yet it grew "high again in the ſpring, and had the ſame "fortune a ſecond time; it lay on the ridges "like ſtraw, but ſprung out anew from the "root, and made a very good crop at harveſt; "therefore, if the like accident ſhould happen, "the owner need not be frighted at it."

Lammas wheat is as hardy as cone, if the ground is dry; and it does not often happen to be hurt by the cold in winter; and, if the danger was greater than it is, there are ſuch advantages in ſowing early, that the farmer ſhould not neglect it when the ſeaſon is favourable.

If

It was cuſtomary formerly to let the wheat grow till it was very ripe, as then it makes moſt meaſure, and parts more freely from the ſtraw; but of late years ſeveral good farmers cut their wheat ſooner, and while the knots of the ſtraw are green, for ſuch wheat looks fair to the eye, handles well and ſlippery, and coming ſooner to market ſells at a good price. Wheat, cut before it is dead-ripe, is ſmooth, and the grains lie cloſe in the buſhel; ſo that it weighs as much per buſhel as wheat that ſtands till it is thorough-ripe, but more grains go to fill the buſhel, and it is more difficult to threſh out clean. Theſe inconveniencies are, however, anſwered by the advance in price.—Cone wheat is not uſually cut till full-ripe.

Drilled wheat ſhould be reaped low, that the ſtubble may not obſtruct the hoeing of the next crop; it ſtands ſo fair to be cut, and no weeds, that it is reaped at half the price of broad-caſt wheat, and being clean from weeds it is ſoon fit to be carried home.

It is uſual to raiſe the new ridges for the ſucceeding crop upon the former intervals, which is alſo moſt convenient, becauſe the mould, whereof theſe new ridges are compoſed, is in fine tilth, and the new ridges are made at once ploughing. In hoeing the earth up to the ridges the laſt time with the hoe-plough, if done as it ſhould when the earth is dry, ſome of the dry mould will be apt to run back into the interval, after the hoe-plough is paſt; and

then a plough with a double mould board may be uſed, to clear the interval of the looſe mould. This is beſt done ſometime after the laſt hoeing with the hoe-plough; for if any weeds ſhould in the mean time ſpring up there, the earth raiſed by the double board plough will be thrown to the right and left up to the ridges, and will cover and ſmother theſe young weeds, will quite clear, widen, and deepen the furrows in the intervals, and by that means the new ridges will be deeper in fine looſe mould. The double mould board plough is very convenient to be uſed for this laſt operation, but ſhould not be made uſe of inſtead of the hoe-plough, as ſome do for the greater diſpatch; but this is an argument againſt the uſe of it at other times, for it is eſſential to expoſe the earth for ſome time to the influences of the atmoſphere, which is not done ſo fully when it is turned up at once to both ridges by the double board plough, as it is when turned up in two furrows ſeparately, and at different times by the hoe-plough, by uſing which conſtantly the ſurface is more enlarged and expoſed, and the land more improved, than by uſing any other inſtrument, cultivators, or any others, that have been hitherto ſubſtituted in the room of the hoe-plough.

The ſtubble is a guide to the ploughman, to make the new ridges ſtraight, and if brought near the rows of ſtubble, the plough,

at two large furrows, will raiſe the middle of the new ridges high enough to be above the ſtubble, when that is turned to the ridges, at two furrows more: this ſhould be carefully attended to, that the ſtubble may not obſtruct the drilling of the ſeed. Four furrows are commonly enough to plough all the mould, and form the new ridges; but, if the ploughman finds any difficulty in making the middle of the new ridges properly at two large furrows, he may raiſe them at four; taking care that they are high enough, and that the ſtubble does not riſe ſo high as the top of the ridges, and obſtruct the drilling. When three or more rows were drilled upon each ridge, it was found neceſſary to raiſe the ridges high, in order to obtain a greater depth of mould, for the benefit of the middle rows: but ridges of the common height are moſt proper, when only a double row is to be drilled on each ridge.

Theſe ridges are to be drilled, and the wheat cultivated, in the ſame manner as in the firſt year; and thus every ſucceeding year the land will produce good crops, ſo long as it is thus cultivated, without manure or fallow. But if any of the hoeings ſhould happen to be omitted, or the wheat ſeems not vigorous enough in the ſpring, let ſome fine manure, as aſhes, ſoot, malt-duſt, &c. be ſprinkled upon the rows in February, which will ſtrengthen the plants.

The foregoing account of the hoeing culture of wheat, being particular, may to ſome appear tedious; but to thoſe who intend to practiſe the New Huſbandry, will, it is preſumed, be acceptable; as not only the beſt method, but the reaſons alſo, in moſt caſes, are here aſſigned for the rules laid down; which was the more neceſſary for a learner, as moſt of the modern accounts tend more to perplex, than inform, a beginner. Drilling wheat in equally-diſtant rows, and hand-hoeing it, is a method that farmers like much better than horſe-hoeing it, and, though more advantageous than broad-caſt ſowing, is not by much ſo profitable as horſe-hoeing. The hand-hoeing does not improve the land ſo much; and the wheat-crops cannot be repeated every year in ſucceſſion, upon the ſame land, even with the aſſiſtance of manure. The land is, however, improved by hand-hoeing; and there is a conſiderable ſaving in ſeed, for a buſhel of wheat is the proper quantity to drill upon the level in equidiſtant rows, and one foot diſtant. This leaves room for the hand-hoe between the rows; which is performed in the ſpring, and the weeds cut down, before the wheat ſpindles, for then the hoe is ſhut out. But as the hoeing both improves the land, and deſtroys the weeds, twice hoeing would improve it more than once, or deep hoeing, and a ſcuffling, to which the only objection is the expence.

If

If the wheat is drilled upon the level, in rows, at two feet diſtance, it may be hoed with a ſmall plough, and will produce better crops in that way, than by hand-hoeing; and if, at the laſt hoeing, the plants are earthed up by the hoe, they will the better ſtand upright againſt the ſtorms of wind and rain. Large crops may be obtained in this method; but there is no other, beſides the horſe-hoeing of wheat upon ridges, by which conſtant annual crops are obtained ſo cheap, and without manure or fallow.

Moſt farmers will think that more than two rows of wheat may be planted to advantage upon a ridge, and the author of this Huſbandry was at firſt of that opinion: for which reaſon he then drilled four rows, and for ſome years three rows, upon each ridge, at ſeven inches diſtance: but, when three only are drilled, the roots do ſo entangle and interfere with each other, that the crop of the two outſide rows are leſſened, and the middle row ſo much ſtinted, that it does not grow near ſo tall, nor produce half the crop of either of the two outſide rows, occaſioned by the obſtruction of its roots, and that the ſeven-inch partitions cannot be hand-hoed ſo well and deep, as the ten-inch partition between the double rows; and therefore no more than two rows ſhould be drilled upon a ridge. It would indeed be better to drill only one row upon a ridge, and then the wheat

might be horſe-hoed to the row on both ſides, which is much more beneficial than hand-hoeing. Ridges of four feet broad would be broad enough, if only one row was planted: but common wheat, in ſingle rows at ſo great diſtance, would not produce a ſufficient crop; and four feet is the proper breadth to hoe the intervals well with a plough: and though an inſtrument might be contrived to hoe intervals of a leſs breadth than four feet, yet the farmer is adviſed, not to drill his wheat, to be horſe-hoed, cloſer than with ten-inch partitions, and about four feet intervals, theſe having by long experience been found the proper diſtance for wheat; and the hoe-plough the proper inſtrument for obtaining good ſucceſſive crops of wheat. When the farmer has learned to raiſe good crops in this manner, he may try to improve, beginning with ſmall experiments; for otherwiſe he may fail of ſucceſs, as has happened to ſome perſons, who attempted improvements before they were acquainted with this Huſbandry, and to others, who have uſed ſome foreign inſtruments, inſtead of the hoe-plough.

For large plants to be horſe-hoed, ſingle rows upon a ridge are moſt adviſeable; as for turnips, cabbages, potatoes, &c. for theſe may be hoed alternately, and produce much better crops than double rows, becauſe they may be hoe-ploughed very near the plants on both

both ſides. This is to be underſtood, when it is intended to take ſucceſſive crops, and to improve the land: for when only a ſingle crop is intended to be taken, a double row of plants may, in ſome caſes, produce a larger crop than a ſingle row: but, in general, the farmer will find it moſt for his intereſt to plant the larger plants in ſingle rows, both on account of improving the land, which is a conſideration of great importance, and likewiſe to keep the land clean, which is eaſier done with ſingle rows, and at a leſs expence, than when the rows are double: and in all caſes it is proper to leave an interval between the rows, whether ſingle or double, of about four feet, that breadth being neceſſary to hoe them properly with a hoe-plough.

There is one advantage peculiar to the horſe-hoeing Huſbandry, which the common Farmer cannot obtain, and deſerves to be well conſidered. When a crop of broad-caſt wheat is harveſted and carried home, the land is become ſtale, and not in order to be ſowed with wheat for a ſecond crop; but the land muſt be ploughed and winter-fallowed, to prepare it for a crop of ſummer corn: but, if the hoeing farmer is deſirous to change his crops, he is not under the neceſſity of winter fallowing, but may ſave that expence, and alſo obtain another crop before the ſpring ſeed-time. Moſt ſorts of common cabbages, and likewiſe the turnip-cabbage and turnip-rooted

rooted cabbage, planted in Autumn, will grow and produce a profitable crop in winter and ſpring, will then be good food for his cattle, and ſave hay. This is a matter of much importance to all farmers, many of them being diſtreſſed to find ſufficient food for their cattle in winter and ſpring: for this purpoſe much land is employed to obtain a good crop of turnips; whereof, however, the farmer is too often diſappointed by the fly in ſummer, and the froſt in winter; and if the land is very ſtrong, it is not the moſt proper for turnips: but the hoeing farmer may raiſe a ſufficient quantity of the cabbage kinds on a ſmall ſpot of ground and a very little ſeed, as an ounce or two will produce plants enough for an acre of ground; and being tranſplanted in autumn will furniſh a great deal of good food for his black cattle, ſheep, and hogs, in the winter and ſpring. Land that is well hoed is always in good tilth to receive ſuch plants; which, if planted upon ridges, may be horſe-hoed in the winter, and produce good crops on light land, or ſtrong; and the hoeing will not only keep the land in heart, without impoveriſhing it, but will alſo, keep it in fine tilth for the ſucceeding crop. When this is conſidered, the health of his cattle, for fatting them, and for the dairy; likewiſe the great quantity of good manure that may be thus raiſed; it will be evident to every experienced farmer, that this is an advantage of great

great conſequence to him, and cannot be ſo eaſily obtained in any other way, as it may by the New Huſbandry.

In this huſbandry there is a ſaving in ſeed and in labour; but the principal article ſaved in cultivating wheat is in manure. We have ſhewn above how neceſſary manure is in the Common Huſbandry, and how great dependance farmers have upon manure for wheat, their principal crop: as this is the caſe in the Common Huſbandry, a method of culture wherein this expenſive article may be ſaved, muſt be of great conſequence to every farmer, who is at the expence of no leſs than from fifty ſhillings to five pounds for every acre of wheat, and is wholly ſaved in the New Huſbandy, which in general requires no manure for wheat, except a light hand-dreſſing in the ſpring; and this only in ſome particular circumſtances, where there has been ſome neglect in hoeing, and is not neceſſary where the culture is duly performed. Now if a farmer raiſes annually twenty five or thirty acres of wheat, and he ſaves only three or four pounds an acre in manure, it will be an article of great conſequence to him; but when it is conſidered that the manure ſaved in his wheat enables him at the ſame time to dreſs his other lands with it, either for his crops of turnips, or others for feeding his cattle, and to dreſs his cultivated graſſes, meadows, and paſtures; every experienced farmer muſt be

ſenſible

ſenſible how highly beneficial the New Huſbandry is to thoſe who practiſe it with ſkill and perſeverance.

The lateſt accounts of the practice of the New Huſbandry, related in Mr. Doſſie's memoirs of agriculture, are the experiments abovementioned, made by Sir Digby Legard and Mr. Lowther; and he concludes, page 377, "There are, ſays he, however ſuch accounts "of experiments already made, which have "been laid before the public, or the Society "for the encouragment of Arts, &c. as gives "the greateſt room to believe, that through "the increaſe of produce in quantity or value, "or the diminution of expence, the profit "of tillage may, in a term of ſeveral years "taken together, be rendered a third greater "or perhaps even doubled to the farmer, by "the ſubſtitution of the drill culture in the "place of the common or broad-caſt. This pre-"ference appears from experiments alſo in "ſome degree to hold good of indifferent, as "well as rich ſoil; and of other kind of "cultivated plants as well as corn, and to "have many other advantages."

If ſuch are the advantages from this Huſbandry when executed imperfectly, how much greater will it be to the Farmer, who performs it in the beſt manner, and according to the directions of the Author of it? He had near four quarters of wheat by meaſure, upon twenty-five acres of his beſt land; and about twenty buſhels,

buſhels at an average upon his whole farm, nine gallons per buſhel. The extenſive practice likewiſe of Mr. Dean, continued many years, and of Mr. Craik, in a ſoil and climate unfavourable to the New Huſbandry, ſhew plainly the profit of it much beyond what Mr. Doſſie has ſaid; and what may be expected, when performed with the ſame care and judgement, as the induſtrious Huſbandman beſtows upon his land in the Common Huſbandry.

This has been proved by experience by that eminent huſbandman Sir Digby Legard, who has ſhewn the New Huſbandry to be more advantageous, not only than the common huſbandry in his neighbourhood, but alſo to the moſt improved modern huſbandry here or abroad; and, upon a full view of both, he concludes as follows. "But the farmer," ſays he, "who is ignorant of theſe modern "improvements, ſurely ought not to heſitate "to adopt the drill culture; which a few "years practice would render habitual; and "which he would find *much more beneficial.* "For it is certain, that this is *leſs expenſive* "than the old method; and, when once "adopted, *eaſier in the execution.*"

FINIS.

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